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The Bureau assumes no responsibility with regard to the opinions and the results of experiments published in the Bulletin.

The Editor's notes are marked (Ed.).

FIRST PART.
ORIGINAL ARTICLES

**The Administrative Measures taken in Holland
in Favour of Cattle Breeding**

by

F. B. LÖNNIS

Inspector of Agriculture at the Hague.

Whilst the measures adopted by the governments to further the breeding of horses are regulated by a special law (Law of 1901 on horse breeding), it is not the same with those for cattle. Already in 1809, under king Louis Napoleon, a law was enacted on the selection of bulls which forbade putting at the disposal of the public non-approved bulls, but it was not applied on account of the various times then prevailing. After the reestablishment of the independence of the country, ordinances were issued by the various governments, with the encouragement of the Government, on the selection of bulls, but they were gradually abrogated because it was thought the improvement of cattle might be safely entrusted to the farmers themselves.

Under the influence of the agricultural crisis which was felt in Holland at the end of the nineteenth century, a change in public opinion took place by degrees, and the Government was urged to abandon its previous attitude and to take in hand the agricultural interests.

Several provincial administrations had already set the example. North Brabant had re-introduced the compulsory approval of bulls, with a system of bounties; the province of Limburg followed the example in 1890. The other provinces placed at the disposal of the provincial administration subsidies to be granted to the best bulls. These subsidies induced the Central Government to appropriate a sum of 100 florins (£ 2 500) in the 1897 budget, for the encouragement of cattle breeding. Since then the above sum has been gradually increased. At present the budget of the State includes every year appropriations for the following objects:

- a) Grants to associations possessing a herd-book.
- b) Grants to provincial commissions for the improvement of cattle.

- c) Nomination of experts in the matter of breeding.
- d) Institution of courses for the improvement of stables.
- e) Subsidies to national shows.

A. *The Herdbooks in Holland.*

There are two great associations in Holland which possess herdbooks. One is that of the **Netherland Cattle Herdbook** (*Nederlandsch Rastamboek*), and the other that of the **Friesian Herdbook** (*Friesch veestamboek*). They receive every year from the Government of 15 000 florins (£ 1 250) and 7 000 florins (£ 583) respectively. There are also two other less important associations having mostly local influence and which are not in receipt of Government grants.

The **Netherland Cattle Herdbook** dates back from 1873; it includes the three following: The **Black-and-White Holland** breed, the **Black-and-White Yssel** and the **Black-Whitehead Groningen**. To a certain extent this Herdbook may be considered as the fusion of three separate herdbooks. A General Direction at the Hague issues the regulations followed by the three herdbooks. This federation aims at favoring the creation of breeding associations, by giving them the possibility of registering in the herdbook, obliging them at the same time to observe their statutes, regulations and instructions for the keepers of the herds and for the milk control assistants to the approval of the directors of the herdbook.

At the end of 1912, fifteen associations formed part of the **Netherland Cattle Herdbook**, and there is every reason to believe that this number will increase considerably in the future.

The **Friesian Herdbook** dates from 1879. It deals only with **Friesian cattle**, and registers only the **Black-and-White** and **Brown-and-White** Friesian animals. The **Friesian Herdbook Association** works in intimate touch with the provincial commission for the improvement of cattle. The central examinations of bulls are carried out by the **Friesian Herdbook Association**. The surveillance of the work of the milk control assistants, of the breeders' associations and of the control associations is effected by the **Control Commission of the Friesian Herdbook Association** in which the milk expert of the province has a seat.

In order to be entitled to a grant the bulls must be registered in the herdbook.

The registers of the herdbook already contain 4151 bulls and 12 000 cows, or a total of 17 144 head. In the printed herdbook, the percentages of the 6 500 cows under milk control are given; 31 Friesian breeders appear as having all their cattle registered in the herdbook.

B. *Bounties granted by the Central Government to the Provincial Commissions for the Improvement of Cattle Breeding.*

The manner of using the government and provincial grants is set forth by the "Regulation on government subsidies for cattle breeding".

gulation was issued in 1897; the grants were at first exclusively devoted to the awarding of prizes for bulls. But the opinion steadily gained ground that it was not enough to bestow prizes only on bulls, but that cows also should be taken into consideration. The most practical method of attaining this object was to encourage the spirit of association among breeders, which gives rise to breeding associations, to associations of breeding animals in common, and to control associations. These considerations led to a modification of the general regulations which was effected in 1907.

At present in each of the eleven Dutch provinces the members of the permanent Commission of the Provincial States appoint a commission for the improvement of cattle, after having consulted the agricultural institutions of the province and the herdbook associations designated by the Minister of Agriculture, Industry and Commerce. The cattle expert, the milk expert and the provincial professor of agriculture have seats in the commission as advisers, but do not vote.

These provincial commissions have to draw up a regulation for the execution of the government and provincial grants and bounties, to propose one or more examining commissions, and to administer and distribute the sums devoted to grants and bounties.

The Minister of Agriculture, Industry and Commerce appoints one member to each of these commissions.

Every year before the 1st of March the provincial commission sends the Minister: *a*) a statement of the sums placed at its disposal by the government; *b*) a brief report giving an exact statement of the condition of cattle breeding in the province during the past year; the proposed budget for grants and bounties to be approved by the Minister.

At first the government and provincial grants were almost exclusively devoted to making up bounties for bulls, which were awarded according to external characters, but gradually their pedigree and the quality of their offspring were taken into account.

In 1911 the provincial commissions received from the government from the provinces the following grants.

Provinces	Government grants			Provincial grants		
	£	s	d	£	s	d
Groningen	258	6	8	208	6	8
Friesland	529	3	4	460	0	0
Drenthe	333	6	8	166	13	4
Overijssel	368	6	8	123	0	0
Gelders	500	0	0	1000	0	0
Utrecht	370	16	8	375	0	0
North Holland	500	0	0	416	13	4
South Holland	491	13	4	607	1	8
Zeeland	250	0	0	250	0	0
North Brabant	366	13	4	625	0	0
Limburg	258	6	8	166	13	4
Total	£ 4226	13	4	£ 4400	8	4

About 60 000 florins (£ 5 000), or about two-thirds of the total placed at the disposal of the provincial commissions by the government and the provinces, were distributed as bounties for the bulls presented to the examination commission. These examinations are divided into local, district and central examinations.

The local examinations precede the district examinations; the former are held in localities easily accessible to breeders, and in them the animals which may compete for the district bounties are picked out. The district examinations are held in several provinces and concern the animals which have received bounties in the local examinations. They form at the same time markets for breeding animals and as such are highly appreciated by farmers.

Certain provinces (Groningen, Utrecht and Drenthe) award bounties not only to cows also, but these examinations of cows have not yet developed much, because it has been understood that the object was better attained by subsidizing the breeding associations. Accordingly the activity of the provincial commissions was more and more directed to the development of the spirit of association among breeders, and this movement is unceasingly spreading. The mode of distributing the grants varies from one province to another. In some places a fixed yearly grant is allotted, in others the grant consists especially of high bounties for the best association bull.

The control of the subventioned associations for the purchase of breeding animals follows certain fixed regulations, which deal with the milk control of the cows registered in the books of the breeding associations, the manner of keeping the pedigree books, the declaration of the birth of the calves and the care of the bulls.

In Friesland, where cattle breeding is highly developed, there are only five breeding associations, and the whole of the province may be considered as one great breeding association, having as a central body the Friesian Herdbook.

In this province the milk control is effected by assistants who derive their income from the cooperative dairies.

In the other provinces this control is entrusted to special assistants, and the dairy experts play a very important part, both in instructing the assistants and in controlling their work.

The Netherland Herdbook assists also as much as possible in the formation of breeding associations, by admitting well constituted associations and affording them pecuniary and moral assistance.

In five provinces (North Holland, South Holland, Friesland, Zeeland and North Brabant) the breeding and the control associations have grouped themselves into provincial federations having special statutes and a council of management, the members of which are elected by the breeding associations among their members.

The associations for the purchase in common of breeding animals and the control and breeding associations at present existing are the following:

	Associations for the purchase in common of breeding animals	Control associations	Breeding associations
North Brabant . . .	4	—	23
Guellders . . .	23	5	31
South Holland . . .	8	—	27
North Holland . . .	—	—	23
Zealand	21	12	—
Utrecht	—	4	15
Friesland	56	90	5
Overijssel	19	2	10
Groningen	—	3	7
Drenthe	43	—	5
Limburg	43	—	2
Total	217	116	148

breeding Experts, Dairy Experts, Government Professors of Agriculture.

In each of the 11 provinces there is a professor of agriculture and a expert appointed by the Government; in three of the provinces there are also breeding experts. Breeders owe a good deal to the influence of these officials, who have taken a special interest in the organization of agricultural and breeding associations and who have contributed their zeal to the foundation of a great number of associations for the use in common of breeding animals and of others for control and breeding.

The milk control has been greatly facilitated by the support of the experts, who, thanks to their courses on the examination of milk, have formed a competent staff for milk control and breeding associations; in which they have freely opened their laboratories for the examination of milk. But as their task was a heavy one, the Government realized the necessity of appointing special officials or breeding experts who could devote themselves wholly to the improvement of cattle. The first breeding experts were appointed in 1908 and the Government proposes increasing their number as soon as capable officials can be found.

D. Stable Competitions.

Thanks to the cooperation of the dairy and breeding experts, the agricultural associations and the cooperative dairies organize every year competitions for the improvement of stables. There are at present in various provinces special commissions which manage and watch over the competitions. They are composed of some practical farmers, of one of the above-mentioned officials, sometimes of a veterinary surgeon and of a representative of the institute for agricultural machinery and rural constructions attached to the Higher School of Agriculture and Forestry of Wageningen.

Most of these stable competitions are subventioned by the Government and are subject to special regulations. They have been very especially in backward districts, as they have materially assisted in bringing about such improvements as were necessary from a hygienic point of view, and indispensable for obtaining a good production of

E. Live Stock Census.

The Government makes a census of live stock at determined intervals. The last was taken between May 20 and June 10, 1910. It shows that there were then in Holland 2 026 943 head of cattle against 1 604 480 in December 1904, namely an increase of 336 480, or 20 per cent. The cattle are distributed as follows in the various provinces

Number of cattle per 100 acres of arable land, pastures and gardens	Number of cattle per 1000 inhabitants
1. Utrecht 55.8	Friesland 845 head
2. S. Holland 51.4	Drenthe 556 "
3. Friesland 46.1	Overijssel 476 "
4. N. Holland 41.7	Utrecht 459 "
5. Guelders 39.3	Guelders 443 "
6. Overijssel 37.2	N. Brabant 364 "
7. Limburg 32.8	Zealand 363 "
8. Drenthe 32.8	Groningen 322 "
9. N. Brabant 32.4	Limburg 314 "
10. Zealand 22.7	S. Holland 222 "
11. Groningen 22.3	N. Holland 185 "
General average <u>38</u>	General average <u>348 head</u>

F. Measure adopted to favour the Exportation of Cattle.

In order to afford foreign importers of Dutch cattle the greatest security as to the sanitary conditions of the cattle intended for exportation, the Government issued on September 11, 1908, a Royal decree dealing with the examination by a veterinary surgeon of breeding cattle intended for exportation. The veterinary delivers a certificate which declares that the animals are free from any contagious disease. The chief of this inspection service, which includes examination for tuberculosis also, is the Director of the Rotterdam Government Institute for the preparation of serums. The veterinaries entrusted with the inspection are expressly appointed by the Government.

Belgium is the country which purchases the greatest number of cattle from Holland (mostly animals for the butcher, but also milch cows). Germany and England do not allow the importation of live cattle, but the exportation of the meat for those countries is very considerable. The demand from abroad for Dutch breeding cattle is also increasing: they are exported at high prices to Italy, Spain, Portugal

Austria, Galicia, Russia, Sweden and also to South Africa, and Japan. Late years the foot-and-mouth epidemics have rendered export much more difficult. In 1909, a year which may be considered as a bad one, the exportation of live cattle was about 109 000 head.

G. Shows.

Every year agricultural shows, at which cattle occupy an important place, are held in Holland. They are frequently organized by agricultural associations and have a provincial or rather local character. It is proposed now to hold at fixed dates agricultural exhibitions which will be organized by the Royal Netherlands Agricultural Society. This will not only give an idea of the various branches of agriculture in Holland, but will also serve purposes of demonstration and instruction.

The first great national show of this year will be held at the Hague from September 13 to 16. It promises to be very interesting, and it has received from the Government an appropriation of £ 25 000.

The Poultry Industry in Great Britain

by

EDWARD BROWN, F. L. S.,

*Hon. Sec. National Poultry Organisation Society;
President International Association of Poultry Instructors and Investigators.*

Any voluntary effort must be mainly attributed the great development in respect of the Poultry Industry within recent years, rather than the support accorded by State and local authorities. The time has arrived, however, when the last named are undertaking responsibility for promotion, teaching and organisation of Poultry-keeping as an economic pursuit, which may profoundly affect future production, not only as to quality and volume. It is now recognised that instruction, investigation, research and organisation are public services that must not be left to the initiative of individuals or private bodies, more especially as those to whom we must look for increased production are mainly smaller farmers and occupiers. As evidence of this fact may be cited the relative number of poultry kept per 100 acres of cultivated land in 1908 in relation to the size of holding, as published by the Board of Agriculture and Fisheries, the result of a Census taken in a year named.

Area		No. of Poultry	
Above	1 acre and not exceeding	5 acres	1 041 per 100 acres.
" 5	"	50	272
" 50	"	300	88
" 300 acres.	"	"	42

Thus the farmers under five acres had *pro rata* to the size of holdings 25 head of poultry for every one on farms of 300 acres upwards. Such is a very suggestive fact, one which explains much greater production is looked for where small holdings at present exist or increase in number.

The last poultry census referred to above was taken in June, and the total figures published include both old and young birds, totals given are as in Table I.

TABLE I.

No. of Poultry in Great Britain (1908) and Comparisons per Thousand Acres of Cultivated Land.

Country	Fowls		Ducks		Geese		Turkeys		All Poultry
	Number	Averages	Number	Averages	Number	Averages	Number	Averages	
England . .	25 962 000	1 057.0	2 395 000	97.5	494 000	20.1	541 000	22.0	29 392 000
Wales . . .	2 287 000	820.5	274 000	98.3	192 000	68.8	87 000	31.2	2 840 000
Scotland . .	4 107 000	844.5	294 000	60.4	26 000	5.3	69 000	14.2	4 496 000
Great Britain	32 356 000	1 004.0	2 963 000	91.9	712 000	22.1	697 000	21.6	36 728 000

The above figures for Great Britain include the Islands unenumerated in the census.

The true basis, however, is the number of adult stock, as they represent the breeders. In Table II are shown the divisions of Great Britain and the percentages of each class of poultry per 1000 acres cultivated land.

TABLE II.

Number of Adult Poultry (1908) with Averages per Thousand Acres of Cultivated Land.

Regions	Fowls		Ducks		Geese		Turkeys	
	Number	Averages	Number	Averages	Number	Averages	Number	Averages
England	1 517 000	516.7	75 000	25.5	13 000	4.4	24 000	8.2
North-Eastern . .	1 673 000	512.2	95 000	26.0	14 000	4.3	21 000	6.4
North-Eastern . .	1 467 000	540.7	76 000	28.0	15 000	5.5	12 000	4.4
Midland	1 485 000	518.2	68 000	23.7	13 000	4.5	13 000	4.5
North-Midland . .	1 568 000	491.1	126 000	39.4	32 000	10.0	24 000	7.5
North-Western . .	1 698 000	538.4	110 000	34.8	28 000	8.8	25 000	7.9
South-Eastern . .	1 873 000	587.1	62 000	19.4	23 000	7.2	11 000	3.4
South-Western . .	2 493 000	769.3	129 000	39.8	34 000	10.5	16 000	4.9
Wales	13 774 000	560.8	741 000	30.1	172 000	7.0	146 000	5.9
Isles	1 240 000	444.8	103 000	36.9	69 000	24.7	26 000	8.9
Scotland	2 429 000	499.4	185 000	38.0	12 000	2.4	27 000	5.5
Ireland	17 443 000	538.4	1 029 000	31.9	253 000	7.8	199 000	6.1

The distribution is shown in the tables. These figures do not, however, include any occupations under an acre in extent, and, therefore, all the poultry kept by cottagers and others in rural districts by private residents in urban and suburban areas are additional. In many manufacturing and mining centres the number of fowls kept by smaller poultry-keepers is several times greater than on the ordinary farms. A conservative estimate is that, taking the country as a whole, the number of fowls shown would be increased by at least fifty per cent were such smaller occupations included. The increase in ducks would be very small, and of geese and turkeys practically nil. The averages given in Table II will show the distribution of the different classes of poultry. So far as fowls are concerned more chickens than adult stock were recorded in 1908 in the North Eastern and South Eastern divisions. In all the others, as in Wales and Scotland, the number of adult stock exceeded the young birds, showing that there egg production was the main object. So far as ducks are concerned, young ducks were the most numerous, followed by geese about 180 goslings to 100 adults,

and turkeys 250 young birds to 100 adults. Of the last named highest percentages were in the Eastern, North Eastern and 8 Eastern divisions of England, where the proportion was 300 to 100.

The tendency for specialisation is more noticeable in the production of high class poultry than where eggs form the chief object. This is true in Britain as throughout Europe. We have the great chicken rearing and fattening industry of south-eastern England, comprising the counties of Sussex, Surrey and Kent; duck breeding as far as Buckinghamshire and parts of the adjacent counties; and turkey breeding carried to its highest point in East Anglia, that is, Norfolk, Suffolk and Cambridgeshire. Formerly in sections of the country, such as Cumberland and Lincolnshire, geese were largely bred. The demand, however, in demand for these birds has been considerable.

These specialised industries are by no means modern, but have increased considerably within recent years, and the tendency is to extend over wider areas. The south-eastern counties have been famous for high class chickens for considerably more than a hundred years, and these still hold the premier position for quality of flesh product. The great feature of this industry is the benefit derived by farmers, cottagers living in the district over a wide area, as they hatch and rear the chickens, selling them at about three months old to the fatter who complete the process by feeding off, then kill, pluck and dispatch to market. Very few farmers attempt to fatten, and fatteners seldom hatch and rear chickens. This division of labour has many advantages and the prices obtained by rearers are, as a rule, highly profitable. During some periods of the year as much as 3s. to 3s. 6d. is obtained for lean, twelve-weeks-old chickens, for which the demand is much greater than the supply.

In the duck districts there is also a dual system, though a different one. There the rearers are mainly small occupiers, some with more than an acre of land, on which they will raise from 1200 to 1500 ducklings in one season. These men do not, however, as a rule keep breeding stock, but purchase eggs for hatching from farmers in the county. When the ducklings make their appearance these are fed rapidly forward, and can be grown to a weight of from 4 to 5½ lb. in less than nine weeks. For good birds placed on the market in March, April, May and June, 9s. to 15s. per couple can be obtained. There are, also, a few large duck plants, one of which has been established for several years, and sends out about 40 000 birds per annum. Simplicity is the great feature in duck rearing.

Turkey farming in East Anglia is mainly on large farms, and these birds form only a part, though an important one, of the general operations.

In many sections wide spread attention has been paid during recent years to egg production, of which the Island of Orkney is an example. As a rule, however, the increase has been chiefly due to the large number of fowls kept by farmers, and the greater attention

to breeding and management. What are called poultry farms, large plants on intensive lines, whilst tried in several cases, as in India, have not been very successful, and are comparatively unimportant factors in the total of native supplies. The policy adopted has been to view as its first object the development of poultry-keeping as a general branch of general agriculture. At the same time, however, intensive methods, more especially on smaller occupations and in urban and manufacturing areas, are receiving a considerable amount of attention.

In this connection it is realised that increased numbers of poultry, whether upon general farms or special plants, involve greater risks of disease and consequent loss to the owners, and also that, with a view to reduction of cost of production, either by improvement of stock or by increased expenditure for food, or enhancement of returns, there is a rapidly growing demand for research with respect to the first named, and for experimental work, suitable for application by farmers and in so far as the latter are concerned. It is in these directions that Great Britain has been behind some other countries. A few experiments have been carried out, some of considerable value, and a limit to the amount of research, more especially in connection with breeding, has not yet been indicated. That the field is as yet scarcely touched is generally admitted. The number of problems presenting themselves for investigation is very great, and these will assuredly rapidly increase with the growth of the industry. Various proposals are under consideration at the present time, one of which includes the establishment of a National Poultry Institute, which would be a centre for conducting higher experimental work on practical lines, as well as for the treatment of disease. It is so anticipated that poultry will, at an early date, receive their share of attention at the scientific laboratories of the Board of Agriculture and Fisheries. Hitherto it has been almost entirely a question of money. Thanks, however, to the sums available by means of the Poultry Development Fund, the Department of Agriculture will be able to make investigations and research, and to make grants to public and institutions capable of undertaking this important and necessary work. Recently such grants have been made to the Agricultural Department of Cambridge University for research in breeding on Mendelian lines, one object of which is an endeavour to produce a race of which shall be non-sitters and yet produce coloured shelled eggs, and to the Cheshire County Council for experiments in respect to table eggs. Further, the Utility Poultry Club has been given a grant in aid of its 'Twelve Months' Laying Competition' on larger lines than attempted before in this country. That, however, is demonstration rather than investigation.

As regards training to local Rural Instruction, hitherto, so far as poultry are concerned, the teaching has been mainly by lectures and addresses, supplemented by short classes and demonstrations, and perhaps visits on the part of the lecturer. The tendency now is more to the employment

of practical instructors, who will go to the farms and there demonstrate better methods, showing as opportunity offers how to perform various operations, and give guidance as to the adoption of improved systems. Besides this some County Councils have made grants to rural schoolmasters, who are sufficiently interested, for the establishment of poultry plants for use in the schools.

In connection with the higher Agricultural Colleges, whilst in some instances a limited amount of attention has been given to Poultry, the shape of theoretical lectures, up to the present time that is inadequate. To some extent this may be explained by the fact that larger farmers have not included poultry to any extent among their stock, save on a non-economic basis, mainly for supply of their household requirements or to provide « pin-money » for the wives of their daughters. A further fact is that as yet there remains a considerable amount of prejudice among farmers with regard to College teaching that many of the students are townsmen desirous of entering country life either at home or in the colonies. Also, several agricultural teaching centres are associated with universities or university colleges in the great cities, where the conditions are not favourable to the success of the branches of farming. Those institutions which are doing most for poultry have farms for teaching and demonstration, of which the following are leading examples:

Sussex Agricultural College, Uckfield.

Midland Dairy Institute, Kingston.

Lancashire County Council School, Hutton.

West of Scotland Agricultural College, Kilmarnock.

Developments are, however, taking place at other institutions, notably Aberdeen, Bangor, Cirencester, Harper Adams (Newport), Leeds University, which it is hoped may in due course extend operations in the direction indicated. What is now advocated is that at the Agricultural College systematic instruction in poultry-keeping should enter into the curriculum, and that connected therewith should be a well equipped poultry station for teaching, practice, demonstration and experiment.

One of the special features which characterises the Poultry Industry in Great Britain is the diversity of breeds found throughout the country. These are due, first to the natural variations of climate and soil met with even within a limited area; second, to the great number of smaller breeders, who give play to their own predilections, and have made selection on independent lines; and, third, to the influence of poultry exhibitions referred to below. Even in the fatter districts there is not that uniformity of race which is found in other lands. Generally, however, during recent years the tendency has been to greater popularity of a few breeds or crosses from the continent. Among farmers those races which are finding the greater amount of favour may be mentioned: the Italian (Leghorn) fowl, more especially the white variety; the Wyandotte; and the Orpington. The two for

are kept specially for egg production, and the latter largely of excellent qualities. In ducks the Aylesbury stands easily at the head of its rapid growth is greatly appreciated, fitting in with our export trade. Of geese the Embden and the Toulouse are about equal, and in turkeys the Bronze American is most widely distributed.

It is unquestionable that exhibitions have exerted a very great influence in awakening interest in the Poultry Industry, more especially directed to the improvement of breeds. Of these a very great number are held annually, between two and three thousand. Within recent years a great cleavage has arisen between what is known as "fancy" poultry, that is, exhibitors, and such as are concerned mainly with the utility side, by which is meant the meeting of market demands and supplies. At one time farmers and others looked to the exhibitions to provide them with stock birds. That is no longer the case. Poultry for exhibition has become largely professional. The extremes of abnormal and non-economic points have been carried, and many breeds have been introduced in so far as their profitable qualities are concerned. Even our agricultural shows have contributed to the same result. There has, consequently, arisen a large class of specialist breeders who do not exhibit, and who regard the egg or flesh qualities as their main object. The sale of breeding fowls, eggs for hatching, and chicks has grown enormously of late years.

As regards handling and sale of produce, the conditions in this country differ materially from those met with in some other countries, wherein production is much greater than consumption. In Britain the reverse is the case. Our exports of poultry and eggs are nominal, and our breeding stock, whilst our imports (inclusive of Irish supplies) value nearly £13 000 000 per annum.

Our operation in respect to the marketing of eggs and poultry has advanced so rapidly in England and Wales as in Ireland and Denmark, and more recently in some parts of Scotland. Nearly fifty local societies are engaged in this business, so that the country is as yet not completely organised on co-operative lines. Such societies have been found to meet with not found elsewhere to the same extent, mainly due to the fact already mentioned that over large areas of England and Wales the consuming population exceeds greatly the number of the producers. I know of no county in either country which is able to meet its own requirements in these directions all the year round as a consequence of which immediate demand is often very keen. Outlets are at hand, and prices obtainable from householders and traders are high, so that the need for co-operative marketing is not felt, nor is the margin good enough to make such combination profitable. The effect, however, of the work done by the National Poultry Organisation Society during the last fourteen years has been beneficial, equally in the direction of increased production, of improved quality, and better methods of marketing. Traders have

been compelled to adapt their systems to modern conditions, a pay higher prices to producers, otherwise by co-operative effort would lose their business. In this way has been secured a great lasting advance in quality of home produce, more especially in eggs, which at one time, as is still the case in many districts, took much too long a time in reaching the consumer, with a consequent heavy loss in value. The society in question has issued a number of leaflets, and has also published reports on the Poultry industry in America, Denmark and Sweden, Belgium, and Germany, have had a wide circulation. In this manner knowledge of what has been done and the methods adopted elsewhere has been disseminated. An estimate has been made that the annual value of the egg poultry now produced in the United Kingdom is about £290 000 and greater by £6 000 000 sterling than was the case 20 years ago.

Sheep Breeding in Hungary

by

DR. BÉLA KOVÁCSY,

Director of the Royal Establishment for Wool Classification at Budapest.

Until quite recently, the next most important branch of agriculture in Hungary to cereal growing was sheep breeding. Already in the twelfth century, there were in Upper Hungary flourishing dairy farms and the mountaineers had also turned their attention to improving the wool of their flocks, even before the Merino breed had spread throughout Europe. The sheep-breeding industry continued to increase in the seventeenth century George Szelepcsényi, Cardinal of Eszék and the Archduke Eugène interested themselves in the improvement of wool, although, until the eighteenth century, only one indigenous breed was known in Hungary, the Racka breed (*Ovis strepsiceros*), one hardy breed (*Ovis aries*).

From 1773, when the Spanish Merinos were introduced into Hungary, only small farmers continued breeding Racka sheep, average and small farmers taking to Merinos exclusively. From this time, the Racka spread rapidly, and so great an impetus was given to sheep breeding that even the Hungarian magnates turned their attention to the industry. It was only later, on the abolition of statute labour, when the domains began to turn their pastures into arable land, that the number of sheep decreased. The pastures decreased from 18 487 500 acres in 1869 to 16 354 500 in 1885 and 16 070 000 in 1895. Further, the introduction of overseas wool, especially of the Australian product (which was first imported into Germany for the first time in 1850 by English merchants), the amount imported into Europe in 1869 being 1 500 tons, caused a great change in our sheep farms.

In the last quarter of the past century, owing to the low price

reeding sheep for mutton became more general, and large imports of mutton-producing breeds from England were made. These were seldom used to produce pure-bred offspring, but were the crosses often making flocks of excellent quality. the interests of the dairy sheep farms, and especially with a view to the improvement of the Hungarian Racka breed, Friesian sheep were imported in 1884; these animals stand the climate of Hungary and transmit their weight and milking qualities to the cross-breeds. In 1890, from 1890 on, the first Rambouillet sheep were introduced with a view to still further increase the weight and improve the wool of the Racka breed. The Rambouillet sheep were increasingly bred; while the early maturing Soissonnais and Chatillonnais Merinos were also bred for the same purpose.

The most characteristic representative of the Hungarian breeds is the Racka from the Great Plain (Alföld); this animal still exists in its original state on the «Puszta» of Hortobágy, and is also found in the districts of Arad, Békés and Csongrád. The Racka of the plains is a medium-sized animal; height at withers 32 to 34 inches in males, 28 to 30 inches in females; length of body 34 to 36 inches in males, 32 to 34 inches in females. The height at the withers is thus remarkably large in comparison with other breeds of the same length. The live-weight of rams is 130 to 135 lbs., of ewes 110 lbs. The horns of both rams and ewes are long; they bend backwards and are twisted. At the junction of the face and between the frontal bone and the nose, occurs a characteristic depression. The woolly tail reaches the hocks.

The wool, which is 8 to 12 inches long, is composed of thick staple wool; it is used in the manufacture of thick cloths and blankets; for this purpose it is necessary to mix it with finer wools. This breed has to a large extent been superseded on the great Alföld by Merinos; but where the liver-fluke decimates Merino flocks, the Racka sheep flourish, and are not so susceptible to the attacks of this parasite, and avoid the low-lying places. Besides the Racka of the plains, there is also the Racka of the mountains; this is commonest in Transylvania and Upper Hungary; its characteristics have, however, been modified by numerous crosses. It is a weakly, small animal, except in the mountain districts of the districts of Krasso-Szörény and Torontál. In Transylvania also, in certain districts where it bears traces of crossing with Lincolns, this sheep is of a larger size.

The Racka sheep are put to the tup at a year and a half. Lambing takes place usually in February, and the lambs are either sold soon, or kept till the middle of May, when the sheep are first milked; milking generally continues till the end of September. The variations in the number of sheep in Hungary have been as follows.

1851	10 600 000
1869	13 000 000
1895	7 500 000
1905	6 700 000
1911	7 700 000

As is seen, the number was least in 1905, after which it once increased. The number of sheep per 1 000 inhabitants was 1051 in 1880, and 418 in 1911.

The decrease in sheep is recorded especially in the districts Merinos were preponderant, i.e. in the Great Plain (Alföld), and right bank of the Danube.

In 1880 the total still included 67 per cent. of Merinos; in 1911 the percentage sank to 29, and while the Merinos decreased by 38 per cent. the number of sheep kept for milk and mutton rose from 3.2 to 4.1, which shows that breeders consider milking ewes, and secondarily sheep, as more paying than Merinos, whose chief value lies in their wool.

These figures are further explained by the fact that the best milch sheep is chiefly in the hands of small owners in mountain districts where even now, sheep find abundant pasturage, while Merino breeding was continued on the large estates in the plain (Alföld) and in districts on the right bank of the Danube, where owing to the increase of intensive cultivation, the animals were gradually deprived of their pastures.

In Hungary, Racka or Merino flocks graze in the open throughout the year, except during the coldest winter months; and then, if there is not much snow, they pass several hours daily at pasture. Sheep breeding is thus based in the first instance on pasturage, on pastures unsuitable for other animals, and partly on the temporary pastures of farms where intensive cultivation is practised.

Wool and lambs are the chief sources of revenue of the sheep farms. Shearing is done once a year, in June, the sheep are sometimes washed previously. On farms which devote their attention to lambs, lambing is very early, in December or January, so as to profit by the very high prices made by early lambs. The practice is, however, costly because better feeding is necessary. Sheep farms depend on the sale of breeding animals, or the fattening of wethers to fix the lambing time for the end of February or beginning of March. The large sheep farms are occupied also with the sale of breeding animals, either by notice of sale, or at auctions, but especially at a public sale organized every spring at Budapest by the National Hungarian Flock Association. From 1000 to 1500 breeding sheep are sold, of which the price varies as follows:

	£	s	d		£	s	d
Negrette-Electoral: ram	5	0	0	to	20	16	8
" ewe	2	10	0	"	4	3	4
Combed Hungarian: ram	4	3	4	"	8	6	8
" ewe	1	13	4	"	4	3	4
Rambouillet: ram	4	3	4	"	16	13	4
" ewe	4	3	4	"	8	6	8
Early Merino: ram	4	3	4	"	33	6	8
" ewe	3	6	8	"	4	3	4
English mutton breeds: ram	7	10	0	"	8	6	8
Racka: ram	1	15	4	"	4	3	4
Friesian: ram	4	3	4	"	8	6	8

a rule the only food given in winter is straw with a little hay; first class farms a little grain is given. The wethers are put up to fatten at 18 months; besides straw, hay and beet they get $1\frac{3}{4}$ to $2\frac{1}{4}$ lbs. of maize meal per head. According to the census taken on February 28, 1911, the total of sheep in Hungary, without lambs, amounted to 6 677 680 head. The net return at 2s 1d per head, the total returns from sheep to about £700 000. The net return, of the Merinos especially, not be put higher than 2s 1d per head, and is in fact often less. Following figures give the receipts and expenses of a flock of 4200 celled sheep in 1910:

Receipts.

	£	s	d
1) Sale of 34 270 lbs. of wool at about 8d per lb.	1153	5	10
2) Sale of sheep:			
30 culled rams at 26s 8d = £ 40			
240 culled ewes at 13s 4d = 316c			
310 fat wethers at 25s = 387 10s			
	587	10	0
3) Mutton sold to servants and labourers.	60	8	4
4) Sale of skins	48	15	0
5) 3000 tons of dung at about 4s 2d per ton.	625	0	0
Total	£. 2474	19	2

Expenses.

	£	s	d
1) 5% interest on capital expended on 4200 animals calculated at 12s 6d per head: £2625	131	5	0
2) Rent of stable calculated at 5% of a building worth £1875	93	15	0
3) Salaries of persons employed	187	10	0
4) Salt and other expenses	48	15	0
5) Shearing.	37	10	0
6) Rent of 725 acres of pasture at about 5s 10d	212	15	0
7) 512 cwt. of maize at 4s 9d	121	6	8
8) 276 cwt. of oats at 6s 10d	93	6	8
9) 433 cwt. of tall wheat at 2s 1d.	45	16	8
10) 74 tons of mangolds at 8s 6d	31	5	0
11) 245 tons of hay at 42s 4d	520	16	8
12) 25 tons of lucerne at 50s	62	10	0
13) 344 tons of spring-grain straw at 17s	291	13	4
14) 393 tons of winter-grain straw at 10s 2d	200	0	0
Total	£ 2078	5	0

The net return is thus £396 14s 2d, or 1s 10 $\frac{3}{4}$ d per head. But going into consideration that the cost of upkeep of dairy-sheep farms increased of late years, while the price of cheese has risen considerably, the return of these sheep-farms can be put at a slightly higher : 2s 11d per head.

The following is a description of the internal administration of some large sheep-farms.

1. *Rambouillet Flock of the Estate (in trust) belonging to Mr. Alex. Pallavicini at Mindszentágyó.* — The sheep lamb in January, cent. being fertile; the percentage of twins is from 8 to 10, so the increase is nearly 100 per cent. The lambs are weaned at four months and until this time they are given about 10½ oz. of oats, and hay *ad lib.* From the beginning of May to November, the whole flock is on pasture. During winter, the lambs get 1½ lb. and the ewes 2½ lb. of hay, and they are allowed as much straw (from spring and autumn grain) as they will eat. The ram runs with the ewes in August, the latter are 20 months old. The live-weight of the old rams is 255 lbs., that of wethers 132 to 154 lbs., and that of ewes 110 to 120 lbs. The wool is shorn unwashed; the average fleece of old rams is 11½ lbs. while wethers give 11 lbs. and ewes 9 to 11 lbs. The general average is 9 to 13 lbs., yielding 35 per cent. wool. The value of the wool is about 8¼d per lb. The surplus stock is partly sold for breeding purposes and partly as culls; 50 or 60 stud rams are sold annually at 13 guineas. The culls are sold at the current price immediately after shearing, when they have grazed for six weeks.

2. *Emilie Skublics' Rambouillet Sheep-farm at Zalaszentimre.* — Lambing: 80 per cent. of the ewes lamb (twins 7 per cent.); takes place in January. The lambs are weaned at three months. Whilst suckled, the lambs eat first quality hay *ad lib.*, as well as a mixture of oats and maize. The flock grazes during summer; in winter the clover and "three months' hay" (1) as well as straw. Live weight of ram 224 lbs., wether 128 lbs., ewe 117 lbs. The ewes are served in August, when towards two years old. The wool is shorn unwashed; the ram's fleece runs to 22½ lbs., the ewe's 13¾ lbs. The wool is sold in Budapest at 6¾d to 7¼d per lb. Every year 50 or 60 yearlings are sold at the average price of 6 guineas, and culls fetch 16s 8d.

3. *Negrette Electoral Sheep-farm of Count Louis Károlyi at Nagygyőr.* — In the pedigree flock, the ewes lamb twice a year, in January and in July; in the other flocks only once, in January. The percentage of ewes lambing is 70 to 85; twins 2 to 4 per cent. The lambs are weaned at 20 to 24 weeks; up to weaning the pedigree lambs get allowance of oats and lucerne hay. The daily ration of the other lambs is 8 to 10 oz. of oats and 1 lb. of lucerne hay. The young ewes are tupped in the middle of July when 2½ years old. In summer they run on grass; the winter ration consists of 1 to 1¾ lbs. of hay, ¾ lb. of spring-grain straw, 1 to 4½ lbs. of beet tops and leaves, and 2½ lbs. of beet pulp. The fleece of the rams, shorn unwashed, averages 12½ lbs.; the other sheep are washed and the fleece weighs on an average 2½ lbs. The first is sold at 7½d to 9d per lb., the second at

(1) A mixture of vetches and wheat, oats, etc.

The live-weight of the rams is 145 lbs., that of the ewes 88 lbs., that of the wethers 110 lbs. Store wethers fetched 29s the pair in 1908. They are sometimes fattened, when they are given daily 10 oz. of red maize, 10 oz. of beans, $2\frac{1}{4}$ lbs. of hay, $3\frac{1}{4}$ lbs. of beet pulp and little spring-grain straw. Sometimes they get $1\frac{3}{4}$ to $2\frac{1}{2}$ lbs. of maize, $2\frac{1}{4}$ lbs. of hay, and $3\frac{1}{2}$ lbs. of beet pulp. Every year 10 rams are sold at prices ranging from £ 5 to £ 25.

Negrette Electoral Sheep-farm of Count Ladislaus Károlyi at Gyháza. — The ewes lamb once a year, in January. The average lambing is 85 per cent., twins 4 per cent. The lambs are born at 10 months, and while being suckled, are given oats and maize *ad lib.* After weaning, this food is given to the lambs until they are a year old. The same food is given to the rams during the same season and to the ewes while suckling their lambs. The ewes are sold to the ram in August, when $2\frac{1}{2}$ years old. The unwashed wool is sold at 9½d per lb. in Budapest. The average fleece weight is 15 lbs. Culled ewes are sold at 15s to 16s 8d, old rams at 25s to 27s the pair. Wethers at 20s to 25s the pair. The average live weight of full-sheep is 70 lbs. Wethers to be fattened are put onto good pasture and get $\frac{1}{2}$ to $\frac{3}{4}$ lb. of concentrated food. Rams are sold at prices ranging from £ 6 5s to £ 12 10s, ewes at £ 2 1s 8d to 4d.

I will now give some details as to the production of wool and of-trade in Hungary.

The conditions already mentioned led especially to a perceptible increase in the production of fine wool for cloth manufacture; this type of wool is used less and less in Europe, and, as it is also necessary for making the demand for the Hungarian produce is steadily increasing, and manufacturers give very high prices for it. The combed Hungarian wools are also in great demand, as their quality is considerably superior to that of average overseas wools, for it is stronger and free from distles, and therefore much sought after for making very strong yarn. The following are some details on the chief qualities of Hungarian wool. The average yield, calculated at 10 per cent. of moisture, is shown in the following figures, which are based on the examination of numerous samples over twelve years:

Quality	Yield per cent.
Unwashed wool:	
Merino, for cloth	22.4
Merino, for textile fabrics	28.4
combed Merino, for cloths	31.9
Cigája and Racka	51.8
lambes	31.7
Washed sheep:	
Merino, for cloth	71.8
Merino, for textile fabrics	64.6
combed Merino	62.6
Cigája and Racka	76.6
lambes	67.7

	Lowest and highest price per pound															
	1908				1909				1910				1911			
	s	d	s	d	s	d	s	d	s	d	s	d	s	d	s	d
<i>From washed sheep :</i>																
Merino, for cloth, superfine . . .	2	1½	2	3¼	—	2	4½	2	2½	2	3	2	1	2	5½	2
" " " fine . . .	1	10½	1	11¾	1	10¾	2	2½	1	11½	2	1	1	8½	2	2
For weaving, fine . . .	1	0½	1	10½	1	4½	1	8	4½	1	7½	1	6½	1	8½	1
" " demi-fine . . .	1	3	1	5½	1	4	1	6½	1	3½	1	7	1	4	1	6½
" " coarse . . .	1	0½	1	3	1	2½	1	4	1	2½	1	3½	1	1½	1	4
Combed, washed . . .	1	0½	1	3½	1	3½	1	5½	1	4	1	5	1	3½	1	5
" demi-fine, A-B . . .	11	1	2	1	1½	1	4	1	1	1	4	1	1½	1	5½	1
" cross-bred, B-C, containing sand and burs . .		8½		10½		9	1	1½	1	0½	1	2½	1	1½	1	1½
Cigaja, C-D . . .		0½		8		9		10½		9½		11		8½		10½
Racka, R-EE . . .		6½		7½		8½		10½		7½		10		7½		9½
Lambs', superfine . . .	2	2	2	9½	2	3½	2	10	2	5	3	0	2	6	3	0
" demi-fine . . .	1	1½	1	8½	1	3	1	10½	1	10½	1	5½	1	3½	1	4½
" middling and coarse . . .		9		10½		9	1	0½		10½		1½		9½		1½
Shorn twice, from mountains, white and demi-fine, A-B . .	11	4½	1	0½	1	0½	1	2	1	2	1	2½	1	2	1	3½
Shorn twice, from mountains, middling and coarse, B-C . .	11		11¾		10½		11¾		9½		10½		9		10½	
<i>Unwashed :</i>																
Merino, for cloth, superfine . . .	6		7½		7½		8½		0½		8½		7½		9½	
" " " fine . . .	5½		6½		5½		7½		6		0½		6½		7½	
For weaving, fine . . .	5½		6		0½		7½		0½		7½		0½		7½	
" " demi-fine . . .	5		6		6½		0½		6½		0½		6½		0½	
" " coarse, B-C . . .	4½		5½		6		6½		6		6½		6		6½	
Combed, fine, AA-A . . .	6½		7½		6½		7½		7½		8½		7½		8	
" demi-fine, A-B . . .	5½		6½		6		6½		0½		7½		6		7	
" cross-bred, B-C, containing sand and burs . .	4		5½		5½		6½		5		0½		5½		6	
Cigaja, C-D . . .	4½		6½		5		6½		5½		6½		6		7½	
Racka, R-EE . . .	4		5		4		6		5		5½		4		5½	
Lambs', superfine . . .	0½		9		7½		9½		0½		9		6½		9½	
" demi-fine . . .	5½		7½		5½		7½		5½		7½		5½		7½	
" middling and coarse . . .	4½		5½		4½		5½		4½		6		4		5½	

at these data may be properly understood, it should be remarked they include figures from both small and large farms, while those large estates usually far exceed the figures given. Taking this consideration, it may be shown that, not only is the yield of Hungarian wool large, but that the product possesses extraordinary strength, therefore, as just said, is much prized and fetches a high price.

Hungary, since 1894 (Budapest) wool has been sold by public twice a year, in July and October. The amount of wool sold last the July auction was 11 669 bales, while at the autumn auction bales were sold. Besides the Budapest public auctions, there are wool fairs held at Losonez and Miskolez. At the auctions super-ols for cloths are the most sought after, and are considered more as being a Hungarian speciality.

The accompanying table gives the fluctuations in the Hungarian wool during the last five years.

For the wool trade, the importations tend to increase and the exports to decrease, as is shown by the following tables :

Imports.

1906	6 361 650 lbs.	worth	£299 728 10s 0d
1909	7 960 900 "	"	£425 151 16s 10d
1910	8 844 900 "	"	£445 581 9s 2d

The largest amount of imported wool comes from Rumania, which in 1911 furnished 2 618 000 lbs. Almost the same quantity came from Austria and Germany together, while the total import from Belgium, Holland, England and Russia amounted to 2 million pounds.

Exports.

1906	20 664 800 lbs.	worth	£1 049 647 0s 0d
1909	16 907 700 "	"	£ 806 713 4s 2d
1910	16 669 000 "	"	£ 818 315 0s 10d

The largest exportation is to Austria : 11 286 300 lbs. ; next comes Italy with 3 119 300 lbs., while still less is sent to Serbia and Russia. Hungary has also a considerable import trade in woollen stuffs. In 1911 13 142 750 lbs., worth £6 097 008 were imported ; of this amount 11 million pounds came from England and Germany, and the rest from Austria. On the other hand, in 1910 Hungary exported 10 000 lbs. of woollen stuffs, worth £621 154, of which only 233 250 lbs. were sent to Bosnia and Herzegovina, the rest going to Austria. In comparing the trade statistics of 1905 with those of 1910, it can be seen that in Hungary, the woollen stuffs trade is on the increase. While our exports had scarcely doubled during this period, the imports, which in 1905 were not over 14 032 600 lbs., worth £3 106 853, had already more than doubled in 1910.

Cheese from ewes' milk is a considerable item in the trade of Hungary. The following figures give the exports and imports for 1910:

Imports	3 882 900	lbs.,	worth	£161 338 13s 4d
Exports	8 363 700	"	"	£142 520 13s 0d

While the imports have rarely exceeded the above sum, they show a slight, but continuous, increase. The chief export was made from the milk of "Liptó" sheep, which is a cross between Racka breed of Upper Hungary and that of the mountainous districts of Transylvania. This cheese is soft and has a pleasant flavour. Large quantities are exported, even to England. The perceptible increase in Liptó sheep cheese is shown by the following figures, which are for three years:

1901	3 491 000	lbs.,	worth	£ 60 700 16s 8d
1905	4 577 000	"	"	£ 82 178 19s 2d
1910	5 647 800	"	"	£108 876 10s 0d

Hungary's foreign sheep and mutton trade is considerable. In 1910 she exported 135 725 head, worth £162 223, chiefly to Austria, but also to Germany and Switzerland, while the imports were only 173 live sheep worth £125 12s 6d.

In 1910, 2 357 400 lbs. of mutton, worth £53 465, were exported to Austria. This does not include lambs of live weight below 31 lb. In 1910 12 832 of these, worth £5 598 10s, were exported, and 2 133, worth £923 10s, were imported. While the export of mutton hardly shows a perceptible decrease in the number of live sheep exported. Thus, in 1901 the number of the latter was 205 340 head, worth £131 793, while in 1905 it had fallen again to 150 463, worth £133 793.

The trade in skins of sheep and lambs in Hungary is also considerable. In 1910, 2 421 500 lbs. of sheepskins, worth £45 767, were exported, while 1 715 600 lbs., worth £42 805, were imported. In the same year 1 710 000 lbs. of lambskins, worth £72 722, were exported and 712 750 lbs., worth £36 670, imported.

These data serve to show that, while the stock of sheep has decreased in Hungary, as indeed is the case in the other countries of Europe, it is at the present time very considerable and is the source of a large revenue. On the other hand, given that: 1) the agricultural development of the mountainous districts cannot keep pace with that of the great plains; 2) the fields of these districts, which are difficult to cultivate, form abundant pastures; 3) dairy-sheep farming is local, it may be supposed that the decrease in the number of sheep in Hungary will not continue, and that even a fresh impetus in favour of sheep breeding is not impossible.

The Use of Agricultural Implements in Japan

by

UYENO (HIDEZABURO),

Professor of Agricultural Science at the Imperial University of Tokyo.

The traveller in the country districts of Japan is struck with the steepness of the terraced hills and the absence of animals working on the farms. Closer investigation shows that rice being the most profitable crop, wherever it is possible the fields are so laid out that they can be flooded with water, and as to the size of the holdings will show that they are small and many are in a large proportion cultivated by tenant farmers.

These conditions indicate that agricultural implements, such as those of Europe and America, are rarely met with. The system of culture and good crops are obtained, so, as one would expect, the implements in use are well adapted to local conditions.

Of these tools the hoe, or *kuwa* rather, is by far the most important. It is used in a variety of ways, and with a skill surprising to one accustomed only to the simple uses of the hoe in occidental hands. It is used for digging up the soil, thus taking the place of the spade, which is not used. With the *kuwa* also the soil is pulverized and levelled, and thus accomplishing on a small scale the work of the plough, the harrow and the roller.

As to the construction of this most useful tool, it resembles the European "Handhack", but differs from this in the smaller angle that the blade makes with the handle, and the greater length of the blade. The angle is often as small as 30 degrees, and occasionally as great as 45 degrees. The blade is from 4 to 8 inches broad and 10 to 20 inches long, while the handle varies in length from 2 to 6 feet. Where the blade is of the greater lengths, it is made of wood with an iron cutting edge, thus both the weight and the cost are reduced. It is said that there are as many as a thousand different kinds which have been worked out to meet the demands of the various conditions of the soil and the different uses of the tool. When wet or heavy soil is to be worked, the blade of the *kuwa* is divided into two, three or four prongs, as the European spade is to a forked spade.

In importance to the hoe, as an agricultural implement, comes the plough or *suki*. There are two types of the plough: one resembles the single shovel plough of America, and the other the Meklenburger type. The share and mouldboard are made of cast iron and the other parts always of wood. The mouldboard, being plane or slightly curved, is principally to pulverise and mix the soil. The turning action is as great as in the plough of European type.

The striking feature is that one never sees a pair of horse yoke of oxen attached to a plough, the animal used being always This kind of plough is specially adapted for the cultivation more or less wet soil of the rice fields, in which ploughs of occ type would be of no avail. This primitive form of plough is als adapted for throwing the soil into ridges after the rice crop has harvested, so that the earth may dry sufficiently for the growth secondary crop which is obtained from the land before the tr transplanting the rice.

After the rice field has been ploughed, it is flooded and th is thus easily mixed and broken up with the aid of the so-called "hoe" or *ma-kawa*, which is, in fact, a kind of one-rowed harrow.

In doing this work by hand, a kind of rake is used for the p of mixing; while the forked hoe may take the place of the pte breaking up the field.

In cultivating the crops, such implements as the horse hoe ar "Hackpflüge" of Germany are not used, being replaced by a light of the ubiquitous *kawa*. A tool like the weeding hoe of the Occid also in use.

In weeding rice fields, an implement somewhat like the Norw harrow is used. Teeth are set either in straight or curved lines wooden revolving cylinder and the implement is drawn by hand addition to the above-mentioned implement, there are various tools used in weeding.

In seeding, the work was done by hand only, until recent and great skill was attained. Nowadays simple drills and seed drog nvented in the country, are sometimes used. They are small imple and are worked by hand. Wheat and barley are sown in drills rice is thickly sown in small seed-beds from which the young plant transplanted.

For harvesting grain, the sickle, or *kama*, is used altogether. instrument is, in effect a diminutive scythe with a straight or sl curved blade and a straight handle set at a right angle or an d angle to the blade. The handle is from 8 to 16 inches in length for cutting tall grass, a sickle with a longer handle is sometimes

Scythes are coming into use in some parts of the country; but m and reapers are seen only on a few large farms devoted to raising of a and they are mostly of American make.

For harvesting roots, the *kawa* again is used, no such implemen the potato digger and "Rübenheber" being met with.

When the sheaves of grain are ready for threshing, various si devices are used. Ordinarily, the heads of grain are pulled from a de handful of stalks by whipping these into a kind of comb and pulling heads off between the teeth. The comb is fixed to an immovable be which is about half the height of a man, and is set at such an angle: meet the descending stalks at about a right angle. The teeth are al twenty in number and are of sizes suited to the grain to be threshed.

hulls are next removed by grinding the grain between two light arranged like the upper and the nether mill-stone. grain is separated by a kind of winnowing machine, called *tomi*, differs but little from the "Getreide centrifuge" with its arrangement of sloping vibrating sieves. For small quantities of grain, the work is effected in the primitive way by taking advantage of a wind.

Considering the condition of the agricultural industry we are led to the following suggestions :

For cultivation, the use of farm animals should be increased. The advance in the co-operative system for threshing should make it possible to use animals and mechanical powers in this work. The use of ploughs and harrows constructed to suit the needs of the country is encouraged. The "Hackpflüge" or vineyard plough would be nearly adapted to the needs in dry fields.

In the case of wet fields, special implements must be invented, and the necessity has not called for the invention of such devices in the past.

The drills and dropping machines now in use should be improved.

For harvesting there seems to be no possibility of using heavy machinery, and the sickle should be so modified as to be more effective.

In the preparation of grain, however, it is most desirable that modern threshing machines should be brought into use.

There is no special demand for agricultural implements used in connection with cattle raising.

In brief, is the present condition of the agricultural part of the country with regard to the use of implements. But some change is necessary owing to the concentration of labour in the rising industrial centres and the increased demand for agricultural products with the decreased supply of hands. This new condition seems to demand an increased use of machinery together with an increase in the use of farm animals or some mechanical motive power.

The straightening out of the old irregular boundaries between the fields and the re-allotment of the land which is now in progress throughout the country will pave the way for the use of machinery drawn by animals or other motive power.

The kind of implements to be used must be determined by careful consideration of local conditions, and the Government has already instituted a section in the State Experimental Station for the investigation of this matter.

Many of the implements of the Occident are adapted for use on farms only, and none have yet been invented suited for use in the ground of the rice fields. We must look for adaptation of foreign implements, and improvement of existing domestic types, to meet the requirements being the devices called for by the new conditions in New Japan.

Some thirty five years ago, the Government established a implement factory, but at that time the need of new implement not felt and the enterprise, which was in advance of the times, in failure. Nowadays private enterprise is, on the one hand, in imported implements such as experience shows to be in demand; on the other hand, is manufacturing such improved types of implements as have been evolved in the new conditions of the country.

The Development of the Dried Yeast Industry in Germany

by

DR. F. HAYDUCK,

Institute of Fermentation Industries and Starch-making, Berlin.

During the last three years a new industry has begun to develop the products of which are important as food for men and animals, namely yeast drying. Though this industry is still only in its infancy stage, it can safely be predicted that it will soon attain an important position in the economy of the country. The interest which German farming circles have shown for the chief product of the yeast-drying industry, namely «feeding yeast» (Futterhefe), is very lively and has led to an increase and improvement in the economic relations between agriculture and the brewing industry which provides the raw material for the yeast drying works.

The drying of yeast owes its origin to the necessity felt by brewers of utilizing in a profitable manner the yeast which is produced in excess during brewing. In order to understand fully the state of the question a few words on the excess of yeast in the breweries and on its utilization will not be out of place.

In the compressed yeast industry which prepares bakers' yeast the production of yeast is the object aimed at; consequently here an excess of yeast is practically non-occurrent. Just that quantity of yeast is produced which the market will take up. It is quite different in brewing, in which yeast is only a means for the production of beer. The increase of yeast which occurs during the process of fermentation is only a by-product. A portion of this yeast is used in the brewery itself for the new wort; the greater part however remains free for utilization in other ways. *The quantity of this excess of yeast in Germany alone may be calculated at 68 600 tons per annum.*

The utilization of brewers' yeast has been studied with the greatest interest during the last few decades. The need for a solution of the problem is intimately connected with the development of the brewing industries: brewing and the making of compressed yeast. When the industry did not yet exist, all the yeast required by bakers and

olds was supplied by brewers' yeast, which was chiefly the product of fermentation beer. With the flourishing of the compressed yeast industry, the products of which were superior, for baking purposes, to those of yeast, and with the prevalence of low fermentation beers over those prepared by high fermentation, together with the disappearance of small breweries and the transformation of the brewing industry into a few large concerns, the sale of brewers' yeast for bakers diminished constantly. At present it may be assumed that of the 68 600 tons of brewers' yeast at most 9800 tons are used by bakers.

Naturally the brewing industry endeavoured to reconquer the lost markets of the bakeries; only all attempts made in this direction have failed, as it has not been possible by any treatment to make the brewer's yeast equal to the compressed yeast. Other efforts were made to produce extracts of yeast to be used instead of meat extracts for the preparation of food. Although this manufacture succeeded from a technical point of view, it was not possible to find a sufficient sale for the manufactured article; it seems that it is only in England that considerable quantities of brewers' yeast are admitted into the food industry.

In parallel with these efforts one form of utilization was going on which led to good results: *The feeding of fresh yeast to cattle and to poultry.* An especial stimulus to this use of yeast was given by its high protein content, which averages in the dry matter about 55 per cent and allows it to rank among the best concentrated foods. However, the method of utilization could attain only local importance, as fresh yeast, being so perishable, is easily spoiled and does not stand carriage, especially in summer, to any great distance. So that yeast was only useful for the farmers who lived near a brewery and could get the yeast fresh. The yeast was generally carted off together with the brewers' grains, with which it was fed after being boiled.

The chief object of yeast drying is the full utilization of the excellent properties of yeast and the rendering of them available to all farmers. By proper drying can yeast be made to keep good and become a valuable commodity. It is the merit of the Institute for Experiments in Brewing of Berlin that this point of view has been recognized and generally adopted as the basis for the full utilization of yeast. When the Institute began its work on yeast drying in 1910, it found that in some places yeast driers were already at work (the works of Max Oschatz of Dresden at the Schultheiss brewery, 2nd district, Berlin, and the apparatus of Emil Passburg of Berlin at the Food Extract Company in London). The Institute organized a competition for yeast-drying apparatus, and thus furthered the development of the yeast-drying industry. The results of the competition showed that the German machine industry is capable of meeting the demand made upon it by any industry. All the yeast driers tested at the competition were cylinder apparatus, as they are much used in the food industry and especially for potato driers (turning out potato flakes). In Germany a great number have been set up in Germany. German agri-

culture may note with satisfaction that the potato-drying industry been the model which yeast drying has followed. Of the existing drying systems the greater number of apparatus are built by those which have already made a name by their potato driers for producing potato flakes. Also the build of yeast driers is in the main based on experience gained in the construction of potato driers. The principle which all these apparatus are designed is essentially the same. The yeast passes over steam-heated cylinders, dries in fractions of a minute and is continuously scraped off the revolving cylinders by stationary blades.

The section of alimentary physiology of the Institute of Ferment Industries in Berlin, to which the Institute of Experiment and Instruction in Brewing is attached, has also supplied the scientific and practical foundations for the practice of feeding dry yeast. Formerly very little known on this subject. Now, thanks to the researches of Völitz and collaborators Paechtner and Baudrexel, carried out in the above series it is known that dry yeast is one of the richest concentrated foods, it is relished and well assimilated by all kinds of live stock, and that especially suitable for fattening purposes. The writer was the first to draw attention to the fact that dry yeast is not one of those foodstuffs of which corresponds to its calculated food value (like potatoes, or barley) but belongs to those whose price, owing to special dietetic properties, lies considerably higher than their calculated food value (warrant (oats, fish-meal, flesh-meal).

The above researches furnished the following data:

Sheep (1) utilize 94 per cent. of the organic matter, 88 per cent. of the crude protein and upwards of 100 per cent. of the nitrogen extract (2) of the dried yeast, which has a higher nutritive value than cottonseed meal.

For horses (3) more than half of their grain ration may be replaced by a corresponding quantity of nutritive substance in the form of dried yeast and dried potatoes without prejudice to their health, appearance or performance.

For pigs (4) a mixture of dried potatoes, dried yeast and barley, without any dairy by-products, forms a suitable rapidly fattening ration for young animals.

For poultry (5) as regards laying, and for the fattening of geese

(1) VÖLTZ: *Jahrbuch der Versuchs- und Lehranstalt für Brauerei in Berlin*, 1910, p. 48 and 49. *Zeitschrift für Spiritusindustrie*, 1910, Nos. 48 and 49.

(2) This high utilization figure is due to a better utilization of the basal ration caused by the addition of yeast.

(3) VÖLTZ: *Zeitschrift für Spiritusindustrie*, 1910, No. 47.

(4) VÖLTZ: *Wochenschrift für Brauerei*, 1911, Nos. 45 and 46; *Zeitschrift für Spiritusindustrie*, 1912, Nos. 1-4; *Landwirtschaftliche Jahrbücher*, 1912.

(5) VÖLTZ (Work not yet published).

(6) VÖLTZ: *Wochenschrift für Brauerei*, 1913, No. 11.

quality of their flesh, dried yeast proved equal to meat meal (giving equal amounts of nutritive units).
 In the case of milch-cows (1) the use of dried yeast increases the butter-fat of the milk.

In numerous cases it could be demonstrated that feeding the mixture of potatoes and dried yeast which has been recognized as very good, allows of considerable economy in the cost of keeping live stock. (The essential results of these researches are collected in the work of Völtz, Paechtner and Baudrexel «On the utilization of dried yeast for live stock»: *Landwirtschaftliche Jahrbücher*, 1912).

The excellent results which have attended the practical use of dried yeast have caused such a demand for the new food, especially of late, that the supply has fallen decidedly short, notwithstanding the fact that in 1910 and 1913 the number of yeast-drying works has risen from 11 to 17 (of which 11 are in Germany). Correspondingly to the increased demand, the price has risen in the same period from 8s or 9s to 10s 6d per cwt. But the highest limit is not yet reached, because the present price does not correspond to the real value of dried yeast, which consists to a great extent in the increased appetite that this food gives.

The German brewing industry alone is capable of turning out every year about 20 000 tons of this valuable food.

For farmers it will be interesting to learn that they have, often without knowing it, practised feeding yeast for a number of years, when they have used distillers' refuse. This refuse contains all the yeast which is left during the fermentation of the mash. In this connection the following calculation may be made:

100 parts in weight of distillery refuse contain 4 parts of yeast (calculated as compressed yeast). 11 gallons of this refuse per head of stock daily contains 4.4 lbs. of yeast. For every 100 gallons of pure yeast, 400 lbs. of yeast are formed, and as in the German potato industry about 61 000 000 gallons of pure alcohol are produced per year, farms that distil potatoes feed to their stock about 117 500 tons of yeast equal to 35 425 tons of dry yeast.

The yeast content of distillers' refuse is not its least valuable part. On farms which have no such refuse or possess it in insufficient quantity, brewers' dried yeast is a valuable substitute.

Yeast intended for stock feeding is not freed from its bitter principle before drying, but is worked up as it comes from the fermentation. The Institute for Experiments and Instruction in Brewing in Berlin has however undertaken to free the yeast carefully from the hop resin which it contains, in order to prepare it as human food. The work done in this direction has led to surprising results. By means of a competition it has been shown that this purified dried yeast (Food yeast) can be used

in the preparation of a number of savoury dishes and renders good use in domestic economy. Experiments made on a number of persons proved that this food yeast is wholesome and easily digested, and to a great extent it can replace meat in human food. In the course of these investigations it was ascertained (1) that 1 lb. of this food yeast is equal in food value to 3.3 lbs. of average fat beef. But it is not only an article of food, but, as it has been demonstrated by a number of medical experiments, it is also a means of invigorating weakened organisms.

Its power of giving an appetite to debilitated subjects who suffer from inappetence is especially to be mentioned. This specific action of food yeast is perhaps due to its not indifferent lecithin content (N. 2 percent.). The preparation of food yeast has been for the last eight months carried on regularly in a properly equipped purifying and drying installation, and the prepared yeast is daily gaining ground as an invigorating article of food. There is the prospect that this branch of yeast drying will soon develop to an independent industry. The consumption of this food yeast will not be so much in private households as in the food industry, where there is a great demand for savoury material rich in protein. At the present price of 2s 2 3/4 d per lb., and considering equal quantities of nutritive elements, food yeast is cheaper than meat. And in the wholesale transactions with the food factories the prices must be considerably reduced.

According to the present state of the technique, all the yeast of German breweries could yield a yearly output of 13 750 tons of food yeast, equivalent to about 45 200 tons of medium fat beef. The raw material is sufficient to give rise to an important industry. If much of the excess of brewers' yeast will eventually be put to this use, it can not be foreseen. For the moment the bulk of dried yeast will be used for the preparation of yeast for live stock, and the production of food yeast will form only a branch of this industry.

It must also be remembered that the use of yeast as food is to a certain extent no novelty, for yeast has always been consumed in the shape of baker's goods, and in considerable quantities too, amounting in Germany alone to 147 000 tons (calculated as compressed yeast) per year, as the 49 000 tons of yeast required by the bakers becomes three times as much in the dough.

(1) VÖLZ and BAUDREKEL: *Biochemische Zeitschrift*, 1911, Vol. 30, Part 6; Vol. 31, Parts 3 and 4.

The Control of the Japanese Fruit Scale (*Diaspis pentagona*) in Italy

by

Prof. ANTONIO BERLESE,

Director of the Royal Station of Agricultural Entomology at Florence.

My experience of many years has shown that the artificial control measures used against *Diaspis pentagona* are of value only for the season in which they are carried out, and cannot be expected to get rid of the scale permanently or sufficiently to allow of the healthy growth of the

mulberry. This is the reason of the general complaints about these measures, and the doubts entertained by mulberry-growers as to the value of the control. The doubts which are all the more in evidence where the disillusion is greatest, that is where the scales have been present longest.

The natural methods are thus aimed, not at the extermination of *Diaspis* from its present quarters, as this would be impossible, but at reducing its activity to a minimum, and thus taking the place of the artificial means. These were repeatedly and energetically employed, or in other words, the scales were prevented from doing any damage.

Among natural means predatory insects are now no longer considered: it was already foreseen two years ago, when they were first talked of, that they would not be sufficient. The only remaining enemy of value is *Prospaltella berlesei*, a small species of the Hymenoptera which is the special endophagous parasite of *Diaspis pentagona*. I have, in two earlier papers (1), described its introduction into Italy and its diffusion in the peninsula during the first three years, 1908-1910. We may now discuss the present state of affairs in the control of *Diaspis*. For this purpose it may be well to consider first what is the state of the scale in neighbouring countries, namely in Switzerland and over the whole of the Empire of Austria-Hungary, where *Diaspis* is present to some extent.

In Switzerland it was only last year that *Prospaltella* was imported, and I have just found that it has established itself in the neighbourhood of Locarno.

In the Trentino (Austria), Prof. Osvaldo Orsi, of the Royal-Imperial Agricultural Institute of San Michele, began importing the insect in 1909; since then it has been carefully distributed in the territories of Ala, Riva, Trento and Trent, altogether in 12 jurisdictions, comprising 37 communes. It was let loose at 28 centres on 1478 mulberries, and from these

1. BERLESE: La *Diaspis pentagona* e gli insetti suoi nemici. - *L' Italia agricola*, 1911; Vol. VI, Part 2, p. 298, 1911. ID.: Come progredisce la *Prospaltella berlesei* in Italia. - *Redia*, Vol. VII, Part 2, p. 436.

(Author's note).

it is spreading out naturally or with assistance to all the surrounding trees. The excellent results attained are attested by a pamphlet published by the Provincial Agricultural Council of Trent (bibl. 7), and several articles in different newspapers, among which I may note by Prof. Orsi entitled: "La *Diaspis* del Gelso è vinta" (The *Maul* *Diaspis* is defeated), published in the organ of the Trent Farmers' Association (bibl. 13).

In Görz the spreading of *Prospaltella* was carried out very carefully by Prof. Bolle, who obtained living examples even from Japan. The parasite is now well distributed in many centres and its good effect have recently been described by Prof. Bolle in a study entitled "Maulbeerbaumschildlaus (*Diaspis pentagona*) und die Mittel zu ihrer Kämpfung", (bibl. 8). The Director of the Royal-Imperial Station of Agricultural Chemistry of Görz, after giving the results of his experiments made in 1910, 1911 and 1912, comes to the conclusions that had already reached, in particular that *Prospaltella* is an efficient means of controlling *Diaspis*, completely replacing the most efficacious and means carefully applied every year.

In Istria *Prospaltella* is now widely spread, according to Prof. 1 and the Royal Station at Florence possesses documents showing that it was introduced there in 1909.

The Austrian Government has twice sent competent persons to the centres of infection of *Prospaltella* and study its effect; as a result the Government arranged an extensive distribution of the insect in Trentino, Görz, Istria and Dalmatia, as well as to silkworm colonies in Italian territory, and printed instructions, illustrated leaflets, etc., were prepared.

In our peninsula the oldest introductions of *Prospaltella* are at Vanzago, near Milan; Acerra, near Naples; the Palombina, near Grottammare in the Marches; and Genoa. Vanzago supplied the material for distribution, so that *Prospaltella* has become common there; but all the same *Diaspis* is now very scarce, as the parasite spread naturally from the few infested scales which were left there in spite of the most careful search for material. In the neighbourhood the scale is abundant, but the parasite has not been able to spread. The effect of *Prospaltella* at Vanzago is referred to again in the *Bollettino dell'Agricoltura*, organ of the Lombardy Agricultural Society for April 11, 1913; to this Dr. Del Bo, travelling lecturer in agriculture at Milan, contributes an article entitled "L'esperienza di Vanzago conferma la bontà della *Prospaltella*." (The results at Vanzago confirm the usefulness of *Prospaltella*). He says that a party of representatives of the Lombardy Agricultural Society, from the Association of Silk Egg Breeders, and from the travelling lectureship, were able to recognize that the *Prospaltella* "represents a providential assistance of great value against *Diaspis*" and "makes all other methods of control unnecessary." He concludes that farmers should have "unlimited confidence in the new means of control." At Acerra, Sig. Nuzzo's small

tion of 350 fine trees, which were formerly covered with scales, quite free, and for two years no attention has had to be given. In all the country round the *Diaspis* is infested or else already destroyed. In the Palombina and at Grottammare the destruction is complete, and the same may be said at Genoa.

In 1909 other distributions of *Prospaltella* were made all over Italy, some forty cases it established itself. In 1910 about 2500 distributions were made, but hardly more than 50 per cent. were successful. There was no doubt due to the feeble numbers sent out, but with so many requests and only two small breeding centres the numbers were very limited. In 1911 over 7600 lots were sent all over Italy, but for the same reasons the cases of successful establishment were not more than in the previous year.

In 1912 *Diaspis* was very scarce on account of the weather: indeed in Lombardy and Piedmont in particular it had almost disappeared; for reason little material was sent out, and this was obtained from Veneto and the Trentino, but its quality was excellent. The few hundred distributed came largely from Venetia; the successful cases reached 50 per cent., as ascertained by examination on the spot or from numerous samples sent in to the Royal Station.

The next oldest cases of establishment of *Prospaltella* after the ones mentioned above, made with material from these, date from 1909 (summer) and 1910 (spring) and are those already described in the Trentino, as a few on this side of the frontier. In all these the destruction of *Diaspis* is now complete from the cultural point of view, and includes many acres of land round the first centre of infection.

It is only in Piedmont that the destruction is not everywhere totally evident, and in this respect somewhat resembles the results obtained in less cold regions, so that we may reckon that even in the most northerly localities *Diaspis* will be completely destroyed in the next year.

To give an example: in *Il Coltivatore* for Feb. 20, 1913, p. 45, E. Voglino, director of the travelling lectureships in agriculture in Emilia, reports on the mulberry plantations of Valenza, colonized by *Prospaltella* at the dates mentioned, and in which "at the end of 1912 the results were amazingly evident, so that there can no longer be the least doubt as to the efficacy of the Berlese method for the control of *Diaspis*. On the first mulberry tree colonized by *Prospaltella*, in 1909, I did not find on the 13th of January 1913 a single *Diaspis*, while at the beginning of the treatment it was literally covered with them." In other rows at various distances the parasitization is from 80 to 200 per cent. according to the distance from the original centre. In the 300 yards from the mulberries, parasitized *Diaspis* scales can be found on willows.

From Casalmongera Dr. Gabotto (bibl. 11) and the staff of the *Coltivatore* quote observations and figures, and speak well of the efficacy of the parasite.

In Lombardy, Venegono Inferiore (Como) is now completely protected by *Prospaltella*, owing to the work of Sig. Albé, who, with assistance of the municipality, carried out a planned and regular distribution. At Deserziano the parasite has spread widely, and some a up to half a mile in radius round the centres of infection, have cleared of scales by spontaneous spreading; indeed it may be said that the infection is general in the neighbourhood. This is stated by Sig. Mazzoldi, of the Chamber of Agriculture there, as well as in *Provincia di Brescia*, Nov. 29, 1912, and April 17, 1913, and in *Brescia journals* of the latter date.

At Sillò the *Diaspis* has now been destroyed over several hundred acres about the first centre of infection. In the province of Bergamo, Cav. Ambiveri has already largely freed the mulberries at Seriate, Battica and Tréscorre, in a radius of about a mile from the original infections, and in other places the travelling lectureship of Bergamo requires similar results (bibl. 9) at Seriate, Cavernago, Boccaleone, Torre Boldi, Gorle, S. Gervasio d'Adda, etc.

For Venetia it is impossible to mention all the places where *spaltella* has destroyed the *Diaspis* and followed it up over a large round the original centre without any assistance; in some cases it spread over remarkably large areas, for instance more than 75 acres just over two years at Fregona (Vittorio-Vereto) (bibl. 15), and a similar area in less than two years at Bovolone (Verona). It will suffice to that complete and extensive destruction of *Diaspis* can be seen in Province of Treviso: at Campocroce, Porzano, S. Lazzaro, Fregona, dobbiadene (1), etc.; in the Province of Udine: at Codroipo, Cividale, plis, Faedis, Marzano, S. Giovanni di Marzano, Latisana, Cellon, Sacile, Caneva di Sacile, S. Vito al Tagliamento, etc., to give only names of the chief centres; many of these include several communes. Latisana, for instance, referring to some twenty localities; in this connection the travelling lecturer for Eastern Friuli writes me (March 11, 1913) that he has let out *Prospaltella* in 26 communes in his district: "I have examined on the spot in the last few days", he writes, "I have been able to observe new miracles of spreading: commune after commune completely invaded".

In a recent article in the *Giornale di Udine* (April 17, 1913) (bibl. 20) Prof. Panizzi (the above mentioned lecturer), speaking of *Prospaltella* in the districts of Latisana, Palmanova and Codroipo declares that as a result of a single infection in 1909 there are now thousands and thousands; and that "a not inconsiderable number of growers can from their own experience bear witness to the efficacy of this convenient means of destroying *Diaspis*," and if artificial means

(1) The effect is pointed out in the instructions "for the diffusion of *Prospaltella* in 1913, issued by the travelling lectureship (bibl. 22). It is stated: Our experience from 1909 on show clearly and decisively that *Prospaltella* barleset destroys *Diaspis* pentagons so completely as to render it culturally harmless. (A writer's note)

are not used "within the year *Diaspis* will have disappeared from numerous large centres and in two or three years from the district."

In all these cases it is not a question of only the single mulberry which was colonized nor yet of just a few near it, but of vast areas of land, and generally of whole communes. As an example I may mention the case of Ippis, from which the deputy-mayor writes me: "Every day we hear nothing of *Diaspis*; its ravages are merely a matter of history."

In all the other Provinces of Venetia the state of affairs is much the same as in the two mentioned, except that the proportion between centres of *Prospaltella* infection and those of *Diaspis* infestation is always the same. The whole list is too long to quote, but the following may be mentioned: Mira and Mirano in the Province of Venice; Cittadella, Bassano, Due Ville and Nosedo in the Province of

In all these examples agree perfectly with the result predicted for the case of *Prospaltella* within two years of its introduction into a place, namely the total destruction of *Diaspis* as an agricultural pest in a zone wider or less extent round the centre of colonization. The most striking fact as to the value of the parasite is the unanimous conviction, now firmly rooted and warmly expressed, of all the growers and countrymen who have had the benefit of *Prospaltella* for mulberries since at least 1910.

In almost all the places in which the parasite has been introduced within two years the following occurrence noted by Prof. E. Voglino is repeated: "The countrymen about Valerza have got to recognize parasitized scales perfectly, and as they all have small properties pick out at pruning time twigs with plenty of scales and their fasten on them, and take them to fasten on their own trees". (*Il Corriere*, Jan. 20, 1913, p. 46). Prof. Gastine, (referred to below) states that in some parts of Venetia the countrymen who have got material infected by *Prospaltella* make a regular trade of it, selling twigs of a foot in length with 60 to 80 per cent. of parasitized scales for 5d a piece. So great is the demand, that in March many fortunate owners of parasitized mulberry trees had to watch them at night to prevent the scales from being stolen.

The condition of these less recent introductions is well reflected in the following sentences by Prof. Gastine, who was sent by the French Government to study the conditions as regards *Diaspis pentagona* in 1912: "I wrote to Prof. G. Del Guercio, under date Nov. 26, 1912:

"I have made a long journey in Italy..... to visit places where I may examine the results obtained against *Diaspis pentagona* with *Prospaltella berlesii*. After going to Vanzago I went on to Udine, then to Trieste, to Trent, etc. I also made interesting journeys about Milan, Casalmaggiore, Casalmontebello, etc."

"Everywhere I found the *Diaspis* attacked by *Prospaltella* here and here and there in considerable quantities. Professors and growers alike were enthusiastic about Berlese's method, especially at Trent, in Venetia at Codroipo, S. Vito del Tagliamento, etc. Remarkable results can also be seen at Casale Monferrato.

"After this long enquiry I return thoroughly persuaded that *spaltella* can control the *Diaspis* efficaciously from the cultural point of view".

The requests for material infected by *Prospaltella* received spring were truly enormous; the mulberry twigs with *Prospaltella* sensitization sent out this March by the Institute number 25 365 in Venetia, 5105 for Lombardy, 3520 for Piedmont, 1520 for Emilia, & Liguria, 315 for Tuscany, 200 for the Marches, 1020 for Umbria, 3 the Abruzzi, 30 for Latium and 110 for Campania; total 37 315.

Besides this, thousands of lots of infected material are being spread about on the spot by the possessors of the older and richer breeding grounds; to quote an example, the Hon. Count Rota, who had a great lot in 1909, obtained about 100 in 1910, about 500 in 1911 and 30 in 1912; with these he infected half his own mulberries and distributed a great lot gratis to his acquaintances, while this year he has abundant for himself and others. When we consider examples of this sort that there are several dealers in silk eggs and silkworm observations who breed *Prospaltella* to send out to their clients (1); also that they are agricultural bodies which, although possessing as much as 6 or 7 infected branches, are so overwhelmed by requests that they have to apply to our nurseries for more; and lastly and most important, that the parasite spreads by itself in a single year over acres and acres of under mulberries, it is easy to see how near is the time in which that will remain of *Diaspis* is an unhappy memory.

(1) For example, one of these wrote me on Feb. 14, 1912: "I have thus sent out thousand lots, and am in no doubt about the results".

For 1913 we may quote the cases of only four firms in the province of Treviso breed silkworm eggs: Cav. Moszi, who has distributed 2000 lots; Sig. Zanetti, more than this number; Sig. Bidoli, 1500; and Sig. Fabris, of the Motta Estate sent out 3000.

Besides this there are the thousands sent out from the lectureship of agriculture in the same province: those sent by Prof. Sacchi, Director of the Provincial-Agricultural Institute of Treviso, actually exceeded 9000; Prof. Jelmonli, lecturer at Conegliano-Vittorio, over 2000; Prof. Di Gaddo, lecturer at Oderzo, 1000, etc. From this it will be seen justifiable in the opinion of Prof. Sacchi, who wrote me on March 14, 1913: "In view of the infections already made and their complete success, as well as from the great success which I can undertake this year, I think I shall not be far wrong in predicting that a couple of years hence *Diaspis* will no longer be talked of in my district."

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SECOND PART.
ABSTRACTS

. AGRICULTURAL INTELLIGENCE

GENERAL INFORMATION.

447 - The Project of the Ministry of Agriculture of Hungary regarding Reclamation of the "Pusztá Hortobágy", - BALKÁNYI, BÉLA: in *Madassy Szemle*, Year XXXI, No.3, pp. 125-131. Budapest, March 1913.

The Ministry of Agriculture is at present occupied with a sd for reclaiming the extensive «Pusztá Hortobágy», the largest of these of the vast Hungarian plain (Alföld), and belonging to the muni town of Debreczen. This great «puszta» is 59 700 acres in extent, for centuries has only been used for grazing. The grazing rights determined by an old statute in such terms that the inhabitants of Debreczen alone are entitled to use the land as a pasture on payment a tax fixed by the general assembly of the town. The present system of using the pasture does not in any way fulfil the demands of modern agricultural progress, in that the virgin soil of the «Hortobágy» serves as an indifferent grazing ground for two or three months a year.

Seeing that the present management of the «puszta» is not satisfactory and cannot meet economic requirements, the General Assembly of the town of Debreczen, after having offered opposition for 1 years, finally acceded in March 1912 to the project of the Ministry of Agriculture relating to the systematic reclaiming of the «Hortobágy» scheme which was met by desperate resistance on the part of the land owners of Debreczen, who did not wish to sacrifice their traditional rights to the modern evolution of agriculture.

The scheme embodied in the contract of the Ministry of Agriculture includes:

- 1) The reclaiming and dividing up of 17 000 acres for intensive cultivation and the erection of farm-buildings.
- 2) The creation of experimental irrigated State pastures, 4 250 acres in extent.

The improvement of the rest of the «puszta» for pasturage, the into effect of a new grazing regulation and the reorganization of breeding.

The town of Debreczen has invited the service of the Ministry of Agriculture to mark out the above-mentioned extent of land for intensification and, at the same time, to determine the method of its division into leased farms.

The early realization of this reclamation scheme is the more desirable for the whole nation, seeing that it will mean a considerable increase in agricultural products, and, above all, lead to much improvement in stock-rearing in Hungary.

Ministerial Decree of November 30, 1912, regarding the Promotion of Rabbit Breeding in Prussia. - *Ministerialblatt der Königlich Preussischen Verwaltung für Landwirtschaft, Domänen und Forsten*, Year 9, No. 2, p. 23. Berlin, February 1913.

The decree sent to the Chambers of Agriculture advocates the encouragement of rabbit rearing in future for food and not for purposes of

at the first place, those Rabbit Breeding Societies which aim at increasing and promoting the remunerative possibilities of rabbit-breeding. The keeping should receive help from the Chambers of Agriculture. The assistance might take the form of grants to enable these societies to establish covering stations, to combine for the purchase of rabbits, and to erect suitable hutches. The Minister of Agriculture advocates the keeping of only a few breeds, and those the best flesh rabbits.

Proposed Law on the Production of Wine and on the Wine Trade in the Republic of Uruguay. - *Revista de la Asociación rural del Uruguay*, Year XLII, No. 1, pp. 52-59. Montevideo, January 1913.

The executive submits to the Senate and to the Chamber of Representatives the proposal of a law of which the following are the chief provisions: Prohibition of the manufacture of artificial wines (natural wines defined as those obtained by the alcoholic fermentation of must of fresh grapes); complete liberty in the correction of natural wines; compulsory use of sealed vessels (bottles, demijohns, barrels, etc.) for sales to the consumer; institution of officials provided with the necessary plant for the settlement of disputes between producers and consumers, and for the study and the spread of good enological methods; prohibition of all blending of national wines with imported wines; introduction of taxation on foreign highly alcoholic wines.

The proposed law is followed by some information supplied by the "Boletín de Hacienda," from which it is seen that in 1912 there were in Uruguay 2246 vine growers; 15 106 acres under vines and 23 700 000 lbs. of grapes which produced 41 360 000 lbs. of grapes, yielding 2 321 000 gallons of wine. On account of the unfavourable weather prevalent during the year the crop was only about two-thirds of a normal crop.

444 - Encouragement to Farming and Stock Breeding in the State of Mexico. — *El Agricultor*, Year VII, Vol. VII, No. 73, pp. 623-624, January 1913.

By the Government Decree No. 25 of December 25, 1912, a bonus of 5 pesos (about 10 shillings) is granted for every thousand fruit trees that are planted by any farmer or native or foreign company that devotes itself, after the publication of this Decree, to the planting and cultivation of fruit trees. This bonus will be paid when the first crop of fruit is gathered. All kinds of fruit suitable for exportation claim the bonus. Thus at present the following are included: lemons, oranges, tangerines, avocado pears, chestnuts, mammee apples, guavas, custard apples, mangoes, walnuts, apples, cherries, pears, peaches and olives.

A bounty of 5000 pesos (about £ 500) will be given to the farmer or native or foreign company that will plant and cultivate up to 1000 trees of the first crop two hundred thousand bananas of the Cavendish type. Farmers who dispose of only 12 to 25 acres of land and plant the whole of them with the above variety will get a bonus of 500 pesos (about 30 shillings) for every thousand plants. The following bounties will also be given: 2000 pesos (about £ 200) for every 200000 pine trees (*Pinus pinea*) that are planted, and proportional sums to small landowners who will plant upwards of 10 000 such trees; 50 pesos for five years for every hectare (2.47 acres) of land under vegetables summed in North America such as, onions, garlic, tomatoes, eggplants, artichokes, cucumbers; 5000 pesos (about £ 500) paid down once for every 750 acres to canteloup melons.

For five years the land devoted to the above mentioned crops will be free from land taxes and the buildings used for packing the fruit and storing packing material will be free from State and municipal taxes. Banana meal factories will enjoy the same exemption.

All the irrigation works erected in the future shall be free from taxes for ten years. Neither the amount of capital employed nor the value thus acquired by the land will be taken into consideration.

A bonus of 10 pesos (about £ 1) will be paid once for every hectare (2.47 acres) of land planted to vines and 20000 pesos (about £ 2000) will be paid once for the planting of 100 000 coconut palms, and smaller proportional bonuses will be given to small landowners for every thousand coconut palms that they plant. On all urban holdings in the capital and in the principal centres of the State, which possess four coconut palms in bearing, the taxes will be reduced by one half and for five years. A reduction of taxes to the amount of 100 pesos (about £ 10) for every thousand coconut palms will be granted to those landowners who plant, on both sides of the railway from the station of Alzada to the port of Manzanillo, three rows of palms 26 feet apart and the same distance in the rows. This reduction will be allowed for the first five years following the one in which the palms begin to bear.

sum of 5000 pesos (about £ 500) is allowed to the executive for in view of the sinking of artesian wells.

The first factory erected in the State for the treatment of fibre produced in the State itself will be free from any State or municipal tax for five years.

National or foreign capital invested in the breeding of improved cattle, horses, mules, goats, sheep, pigs or poultry will be free from any tax for ten years, and for five years if invested in rural machinery, decorticators or forage balers.

The executive is empowered: to take the necessary steps to ensure subdivision of landed property while the general agricultural law is carried out, and to promote the foundation, as soon as possible, of a national agricultural bank especially in the interest of small farmers.

The Economy of Agriculture in Great Britain. CAMPBELL, P. P.: in *North British Agriculturist*, Vol. 65, Nos. 7 and 8, pp. 108, 123, 140-141. Edinburgh, January 1913.

The writer gives a short description of the first beginnings of agriculture in general, and especially in England, and speaks of the influence that has been exerted by science, industry and legal enactments upon the development of agriculture in Great Britain right up to the present. In his opinion, agricultural prosperity can only be attained by liberating the country districts and extending the cultivation of cereals.

Agricultural Products of the French Tropical Colonies. — BAILLAUD, E., Secretary General of the Colonial Institute of Marseilles) in *Voordrachten over Koloniale Onderwerpen gehouden ter Gelegenheid van de Koloniale Landbouventoonstelling te Antwerpen*, pp. 143-167. Deventer, January 1913.

French West Africa. — The most important product of this group of colonies is the earthnut; the exports of this crop, chiefly from Senegal, having remained stationary for almost a century, suddenly began to increase when the country was opened up by the railway and more than quadrupled in 15 years, reaching 231 200 tons in 1910; this amount is probably liable to further increase as communications are established in the parts of the interior.

The exports of palm nuts and oil, which come chiefly from the Coast and Dahomey, have also increased in the last few years since railways were established. They were 20 250 tons of oil and 44 080 tons of nuts in 1910, and the products of this industry will reach a much higher figure when the primitive and wasteful processes of the native producers are replaced by more scientific methods. Other exports which are mentioned are:

Pepper: 12 430 000 lbs. (1910); a product of high quality and increasing in quantity.

Cocoa: to the value of £148 500 (1908).

Pepper: 13 560 tons (1910).

Wool: 2 022 tons (1910).

Wool, Skins, and Wool.

Equatorial Africa. — This group of colonies has not prospered well as the former group owing, no doubt, to the fact that the land was divided up and granted to 20 land companies; a large number of them were failures, for they confined their attention to exporting the easily obtained products of the country, such as rubber and ivory, without attempting to develop its other resources. New arrangements have now been made with the Land Companies and free trading establishments. Cocoa and coffee have been planted, but the results of this change are hardly evident yet in the export figures. In 1910 these were as follows: ivory to the value of £ 120 000, rubber £ 7 600 000, timber £ 120 000.

Indo-China. — Here rice is the staple product of the country, and forms over three-fifths of the total exports (1 249 000 tons in 1910). The crops are chiefly raised by natives, and then pass into the hands of Chinese middlemen and from them to the decorticating and bleaching factories. These also are exclusively controlled by Chinamen, and the latter are somewhat given to speculation, crises in the rice market are not infrequent and have an unfavourable influence on the progress of the country as a whole. Maize has also become an important crop of late years, and in 1910 82 920 tons were shipped to France, with a preferential tariff secures a good price for it. Rubber, though exported in almost negligible quantities at present, is being planted largely on the "red soils" of Cochin-China which are specially adapted to its cultivation and where it is estimated that it can be produced at 1 shilling per cwt. Cassava, skins, silk and spices make up the remainder of the export.

Madagascar. — Up to 1895 imports and exports were low, and roughly balanced one another, but at that date capital began to pour into the country and is now beginning to bear fruit as evidenced by a greatly increased production. In 1911 the exports had risen to £ 1 800 000 and exceeded the imports. This development is due to a large extent to the exploitation of native industries, but instead of being carried out by large land companies as in the African Colonies, it is the result of the personal enterprise of individual colonists. On the East Coast the plantations are numerous and have now established nearly 700 plantations, many of which are producing vanilla. On the High Plains, colonisation has been less successful; coffee has proved a failure and the field has now been abandoned to native cultivators. On the West Coast, a good deal of land has been taken up by Europeans, and in many cases plantations of various kinds show signs of prosperity, but the major part must be considered as still in the experimental stage and it is difficult to predict the future from their results. Probably a system of subleasing the land to native cultivators with a division of profits will prove the most successful for this part of the country. Animal produce (including live and dead meat), mangrove bark, Cape peas (Pois du Cap) cassava, rice, vanilla are the chief exports at present, but undoubtedly several other tropical products, such as coffee, cloves, cocoa and coconuts, will also be exported in considerable quantities.

amongst the older colonies, *Reunion*, *Martinique* and *Guadeloupe* cultivated in an intensive manner, producing sugar, vanilla, coffee, essential oils and cassava. Their population consists chiefly of descendants of liberated slaves, and is somewhat lacking in energy at of date in its methods of working; but with the introduction of scientific methods these islands should be capable of still further improvement.

The Condition of the Military Territory of the Chad at the Beginning 1912. — LARDEAU: in *Renseignements Coloniaux et Documents*, No. 2, pp. 73-91. Supplement to *L'Afrique française*. Paris, February 1913.
Information respecting stock-breeding and agriculture; the former already furnishing considerable resources. The writer gives a table of figures dealing with the breeding of horses, sheep, cattle, camels and ostriches. With regard to agriculture, the chief cereal produced in the territory is millet; the following are also grown: earthnuts, sesame, rice, Kanem wheat and lastly the Karité tree. Abundant and excellent hay is produced.

Agriculture in Paraná. — SANTOS, E. in *A Fazenda*, Year IV, No. 32, pp. 2-6. Rio de Janeiro, January 1913.

The State of Paraná, with an area of 92 500 square miles may be divided into two belts: the coast, possessing a sub-tropical climate, and the high lands (from 650 to 3900 feet above sea-level), which enjoy a climate equal to that of the south of Europe. These latter include: 1) the plateau of Curitiba; 2) Campos Geraes, a great extent of pasture-studded with woods; 3) the plateau of Guarapuava consisting of excellent pastures; 4) the valleys of the Iguaçu, Jejuiguassu, Pequiri and other rivers; 5) the valleys of the Ivahí and Tibagi, covered by rich forests. In the whole of the State the temperature ranges from 4 to 28°. The network of streams is very extensive and is capable of yielding considerable quantities of power; thus, for instance, the fall of the Quedas or Guayra on the Rio Paraná could produce 80 millions H. P., the Iguaçu fall 14 millions (the Niagara falls supply 3500 000 H. P.). There is in the State a "Secretaria de Agricultura", it is divided into two sections: 1) Agriculture and Industry; 2) Inspection, Control and Agricultural Education. There is an Experimental Agricultural Institution at Baceachery near Curitiba; a Station of Animal Husbandry at Ponta Grossa; and an Agricultural and Stock-breeding Station of the "Sociedad Agrícola e Pastoral Central do Paraná," founded in 1909. The chief agricultural products of the country are: maté, which 99 501 043 lbs., worth £ 1696040, were exported in 1910-11, and 27 963 681 cub. feet, worth £ 172706, (1) were exported in 1909

The milreis being taken at 18 d.

from the ports of Antonina and Paranaguá, and timber of other than *Araucaria brasiliana* to the value of \$17211 coffee; bananas, pigs, salted meats; cattle; horses and mules; hides. Silkworm rearing is developing regularly. During the last ten years 500 000 bunches of bananas were exported to France from the ports of Southern Brazil. In November 1912 28000 bunches were exported from Rio della P. and 23000 from Santa Caterina.

449 - Agriculture and Irrigation in the Valley of Ica, Peru. - *Peru To-day*, No. 9, pp. 481-490. Lima, December 1912.

As there is no rainfall on the coast of Peru, cultivation is possible with irrigation. At present the cultivable area is not more than 640 000 acres, including 82 000 belonging to the valley of Ica, of which 45 000 are under actual proprietorship, 30 000 acres being cultivated.

The climate of the valley is mild and healthy. The temperature never exceeds 90° F. (26.6°C.) or falls below 46° F. (6.6°C.). During the winter and spring months there are heavy fogs and dews. During the summer months from January to April the Ica river brings down an average of 230 000 000 cubic metres (practically 190 000 acre-feet) of water, equivalent to 775 second-feet. But the fluctuations are so extreme that the total canal capacity is about 60 cub. metres (2 120 cub. feet) second they are not sufficient to utilize the whole of the flow.

The erratic conditions of flow have given rise to the same method of irrigation as that practised in the delta of the Nile. This method consists in catching in the canals as large a portion of the floods as is practicable and distributing it as quickly as possible in relatively small volumes over the entire area to be irrigated.

The cultivated areas are arranged in basins which are inundated to an average depth of about 16 inches at each irrigation. The upland lands of the Ica valley receive two such irrigations a year, the lowlands frequently only one. Nevertheless these lands, about 30 000 acres, produce for exportation about \$1. 150 000 worth of agricultural products per year.

The substructure of the valley is formed by a deposit of water-borne sands and gravels over 500 feet deep and confined between massive impermeable igneous rocks. The water table varies in depth from 20 feet, and wells sunk to a depth of 100 feet below the surface of the water table will give during 3 or 4 months of the year, at least 22 gal. of water per minute for every metre (3ft. 3 in) that such wells are sunk below the water table, provided that they are properly spaced. C. Sutton C. E., Chief of the Irrigation Service of the Peruvian Government, calculates that 30 of these wells would not cost more than \$1. 150 000 including pumps and connections, to which should be added \$1. 500 000 to provide the power installation and distributing system for power and \$1. 20 000 to provide the distributing system for water. The cost of operation might be reduced by using the power for other purposes during two-thirds of the year when not required for pumping, and

fuel the wood of the cotton plants which is to-day burned on is.

th the actual system of irrigating only in summer, 242 to 273 lbs. Peruvian cotton are produced per acre while if American cotton were irrigated in spring it would produce at least twice as much. Amount of well water necessary for this advantage is only one-fifth of the total quantity required to produce a crop.

ring the occupation of the valley by the Spaniards the lands were under cultivation comprised principally vineyards; some of which exist, where vines 150 years old are still producing fruit at the rate of 4 tons to the acre, and in a valley where there is an utter absence of insect plagues. At present however, the principal and most profitable crop is cotton. The production of the valley, including Palpa and Ica, is about 50 000 cwt.

The cotton now grown is of two classes, the native Peruvian and the Upland, erroneously called in Peru Egyptian. The former yields 240 lbs. of clean cotton per acre, and that after eighteen months' maturing, as against 475 lbs. per acre of the American plant after four months' planting. The latter has also the advantage of maturing thus escaping injury from low temperature, and of costing at less to pick. For these reasons American Upland is rapidly taking the place of Peruvian cotton.

The plants usually interspersed with cotton in Ica are: Lima beans (*Lupinus lunatus*), harvested in November, yielding from 60 to 80 sacks of 100 lbs. each per acre and worth 24s per cwt.; maize, sown in February and harvested in June, yielding about 10 sacks of 200 lbs. each per acre and sold f.o.b. Pisco at 6s to 10s per 100 lbs.; chick peas, sweet potatoes and yuca. The above results are obtained from such crops as are irrigated only at the time of tilling the land and sowing. When cotton is sown, the yield of these by-products is less than here.

Besides the above-mentioned plants, in this valley fruit trees thrive abundantly; they are chiefly date-palms, figs, bananas, oranges, apples, mangoes, custard apples and carob trees. The latter are common in Peru in the departments of Piura and Ica. A young tree about 20 sacks of 100 lbs. each, worth 3s per sack. The bean, being a very valuable forage for animals is also used for making tonic wine (algarrobina), as well as sweets. The wood is very durable; it does not rot and is extensively used in building bridges, and for railway sleepers. No sugar has ever been grown in the valley, but in certain northern zones of Ica experimental plantations of sugar and of rice have given such good results that their culture might be established on an important scale.

Charles H. T. Townsend, entomologist to the Peruvian Government, furnishes the following information.

The white scale of cotton which has constituted a serious plague for many years in the North of Peru is absent from the Ica region.

The cotton leaf caterpillar exists throughout Peru but is easily controlled by arsenical preparations if applied early.

* The cotton square weevil is present throughout the cotton district of the Peruvian coast strip, but as it can persist as a plague only in conditions of considerable humidity, it remains inactive for several months at a time, the severity of its injury being thus greatly lessened.

450 - **Agricultural Conditions in Bohol, Philippine Islands.** - SOUTHWICK, *The Philippine Agricultural Review*, Vol. VI, No. 1, pp. 34-39. Manila, January.

This paper gives a general description of the island of Bohol as the chief crops grown there: corn [maize] is grown very generally throughout the island and constitutes the principal food of the people; it is sown on dry soil and transplanted to terraced paddies; tobacco is an important crop as it should be; sugar cane for the market is grown chiefly on the fertile plains between Tubigon and Calape; coconuts are grown for copra and tuba especially; Manila hemp and maguey are much grown. The most common fruits are bananas, mangos, and papayas; chicos and pineapples are produced in limited numbers, while citrus fruits are very little grown. Guava grows wild everywhere, but it is not cultivated. Camotes are the vegetables most grown; they are not attacked by locusts. Mungos are usually planted among maize. The grazing of carabao and cattle is chiefly practised on the northern plain.

451 - **The Relation Between Land Reclamation and Malaria.** - ROSSI, *Giornale Grande e piccola bonifica nel Mezzogiorno*, pp. 8. Naples, 1912.

According to the Parliamentary Report of 1906, the land so reclaimed in Southern Italy is divided as follows:

	acres
Molise	18 321
Caserta Province	44 359
Benevento Province	481
Near Naples	2 049
Near Salerno	37 807
Reclaimed land of the Nola torrents *	35 419
Foggia Province	89 581
Lecce Province	12 351
Basilicata	41 458
Cosenza Province	66 080
Catanzaro Province	20 033
Reggio Calabria Province	11 884

* In this case it is only a question of the regulation of torrents, without hygienic object.

Thus there are in Southern Italy 380 918 acres to be reclaimed in the course of reclamation, since schemes have been made for funds allotted, and in some cases the work is in course of completion. At present large operations are in progress in the lower basins of

no and the Sele. Nevertheless, the malarial zones are much more extensive than the areas, to be reclaimed. As a typical example of the writer cites Apulia, where only about 103 000 acres require being reclaimed out of an area of 5 907 000 acres, and where there are 184 malarial communes as against 53 free from the disease. Except in the growing districts (723 000 acres) extensive cultivation predominates. Further, it must be noted that marshes almost always represent a very small fraction of the land to be reclaimed, which also includes salinisation radii, i.e. land which will derive hygienic benefit from reclamation. Thus, in the plain of Eboli, the marshes are only 4 016 in extent, while the reclamation radius includes 86 765 acres.

It is therefore inaccurate to establish a direct connection between marshes and malaria, and an illusion to believe that large reclamation operations would suffice to bring about the disappearance of malaria. Severe malaria which prevails in so many southern districts is not due to the existence of true marshes and swamps, but to the want of an adequate and systematic cultivation of the soil, to the neglect of the land, to the absence of drainage ditches and of deep ploughing, all causes of the spread of malaria, since they easily permit of the temporary permanent accumulation of stagnant water on the surface of the land and the consequent development of *Anopheles* larvae. Thus, the cultural and hygienic renaissance of the South depends less upon large reclamation operations than upon small reclamation operations, "on the reclamation effected by the field ditch and the spade."

Grants for Agricultural Education and Research in England, 1911-12. — *Journal of Agriculture and Fisheries. Annual Report on the Distribution of Grants for Agricultural Education and Research in the Year 1911-1912*, pp. 112. London, 1913.

In January 19, 1912, revised arrangements were made between the Board of Education and the Board of Agriculture and Fisheries, the object of which is to place Agricultural Education under the supervision of the latter to which is now assigned the responsibility, not only for universities and Colleges in which advanced work is being done, but also for Farm Schools and other provision for Agricultural Education on a lower plane than that of the Agricultural Colleges, which formerly were under the supervision of the Board of Education.

In the financial year 1911-12, the grants awarded in aid of educational institutions amounted to £18 840. The accounts sent in by the Local Authorities of the different counties, and which refer chiefly to 1911, show that they are spending in round figures a total of £100,000 per annum on Agricultural Education. The report gives a detailed account of the different grants and the objects to which they are devoted.

On August 10, 1911, the Development Commissioners recommended the Treasury to make the Board a grant for the furtherance of research in agriculture; the Treasury approved the recommendation, and in a letter dated August 21, 1911, authorised the Board to give effect to the

scheme agreed upon, which included the improving of agriculture providing technical advice for farmers. The general character of scheme was indicated in a Circular issued by the Board on August 1911. In order to secure the services of a number of carefully trained men for work in connection with the scheme, the Board proposed in the years 1911, 1912, 1913 to offer 12 scholarships of the value £150 per annum tenable for three years. Having regard to the institutions available as centres, the Board arranged the counties of England and Wales in 12 "provinces," and have obtained a grant of £12,000 per annum from the Development Fund, which will be employed providing trained specialists in each area.

A sum, not exceeding in the aggregate £30,000 per annum, has been set aside to provide aid for two Research Institutions for Plant Breeding, two for Animal Pathology, two for Agricultural Zoology, one Research Institution and two on three local experimental gardens for Field Growing and one Research Institution for each of the 11 groups of subjects mentioned, other than Animal Breeding. A sum, not exceeding £3,000 per annum, will be given in Special Grants for Research. "Interim Grants," to the amount of £9,263 were made to various Institutions from 1911-1912 to assist in the continuance of work already begun. The Treasury has sanctioned a payment from the Development Fund of £12,000 per annum to be distributed as grants for the purpose of assisting certain Institutions in England and Wales to supply technical advice to farmers and to provide for the investigation of local agricultural problems. The Board draws attention to the fact, that in order to gain the confidence of the farmers, it is necessary to convince them that the Staff of such Institutions is able to advise, not merely in regard to the general principles of cultivation and management, but also to difficulties which lie outside ordinary experience and may require exhaustive investigation and patient research.

The Report gives as Appendix I, an account of the constitution and work of each Agricultural Institution which receives a grant, and the memoranda connected with the scheme are given *in extenso*.

453 - **The Practical Rural Economy of the Royal Agricultural Colleges and Agricultural Schools in Hungary, 1909-1911.** — NYÁRÁDY, JÁNOS: in *Rev. No. 23*, pp. 805-806. Budapest, March 22, 1913.

For about four years the State Agricultural Schools and Colleges have been endeavouring to increase their revenues as much as possible both with a view to augmenting their receipts and also to afford the students a practical object lesson.

The writer sets forth (according to the very carefully kept books of these institutions) the system of agricultural economy practised by professional institutions in general, their stock of cattle, implements, and revenues, as well as their budget and the balance of agricultural operations during the period 1909-1910-1911.

There are 5 State Agricultural Colleges and 19 Schools in Hungary. The total area cultivated by these institutions is 15 767 acres, of which 10 000 acres belong to the State, 5 172 acres are placed gratuitously at the disposal of private individuals, and 8 228 acres are rented. The institutes have proved that there is no bad soil, having brought back to cultivation completely exhausted soils (belonging to the second category) by means of long and costly operations of clearing and reclamation.

Of the total area, 11 916 acres are under farm crops, 394 acres are forest, 2 867 acres are forest, while 354 acres are worked by the students, and 236 acres are turned to various uses. There are 7 867 acres of waste land, of which the following areas have been manured:

	Farmyard manure	Chemical manures
	acres	acres
1909	1 506	478
1910	1 537	747
1911	1 688	1 158

The use of chemical manures is becoming increasingly general. The following table gives the yields per acre of the chief crops:

	Wheat	Rye	Barley	Oats	Maize in cob	Mangel	Potatoes	Lucerne hay	Clover hay	Three months' hay (t)	Dry maize for forage	Meadow hay
	bu.	bu.	bu.	bu.	lbs.	tons	tons	cwt.	cwt.	cwt.	cwt.	cwt.
1909	18.2	27.6	29.3	35.8	24 80	16.0	3.8	36.0	20.7	22.8	12.9	11.1
1910	22.0	25.3	18.9	19.9	31 20	18.8	5.0	36.4	24.0	22.5	41.1	19.5
1911	26.6	27.0	24.5	37.0	24 80	13.3	3.9	30.4	19.3	23.2	35.3	16.2

A mixture of vetches and cereals.

(Ed.)

The cereal crops are used primarily to supply the various institutions, the surplus being kept for seed or else sold. The total number of live stock was as follows.

Year	Horses	Draught oxen	Oxen for fattening	Breeding cattle	Sheep	Pigs
1909	328	386	43	1 220	2 864	1 185
1910	330	365	47	1 256	3 024	984
1911	357	393	37	1 357	2 866	983

This total was somewhat modified during the three years by purchases from abroad and at home; in order to meet present requirements the Institutes are about to acquire first-rate breeding stock of all kinds.

The total capital of the Institutes increased by £ 16 170 from 1909 to the end of 1911. It was divided between the three years as follows:

Year	Land		Buildings		Dead Stock		Live Stock		Produce
	£	s	£	s	£	s	£	s	£
1909	81 485	4	59 506	8	15 921	3	30 185	12	19 375
1910	82 054	16	61 537	14	18 197	0	32 237	1	21 609
1911	80 915	11	66 060	13	19 187	1	35 662	11	25 378

The following is the balance of the three years.

Year	Gross Revenue			Total Expenses	Net revenue			Deficit	
	Total receipts	Increase of capital	Total gross revenue		Total	per acre	Total	per acre	
	£	s	£	s	£	s	£	s	d
1909	22 424	8	4 410	12	26 835	0	25 232	8	1
1910	25 346	4	12 503	1	37 849	5	31 623	19	6
1911	32 304	7	9 161	3	41 465	10	32 401	2	9

454 - **The Agricultural College at Grignon (France).** BRETIGNIÈRE, L.: in *La culture agricole et rurale*, Year 2, No. 15, pp. 405-409. Paris, March 15, 1913.

A short account of the history of the Grignon Agricultural College, the advantages offered to the students by the estate and agricultural industries attached to the College.

455 - **The Canadian Experimental Farms Report for the Year ending 31st 1912.** - Department of Agriculture, Ottawa, 1912.

This is the most comprehensive report so far issued by the Department of Agriculture at Ottawa, as it deals with every phase of Canadian agricultural activity. The first 230 pages are devoted to the reports of the officials whose head quarters are at the Central Farm at Ottawa, the remaining 216 pages dealing with experiments and investigations being carried on at the ten Branch Farms and Stations distributed over the different provinces.

The Dominion Agriculturist, J. H. Grisdale, deals with the live stock and rotation experiments at the Central Farm, giving some interest

tables of costs of working and production: amongst these may be mentioned that of the dairy herd, where it is shown that yields from 3 000 lbs. to 11 000 lbs. of milk per head per lactation were obtained at a cost varying from 2s 6d to 5s 4d per 100 lbs.

The data of the rotation experiments are also most complete, giving turns per acre for each crop and for the whole rotation affording interesting comparisons. The net profits per acre vary from 22s to 38s in the different systems.

The Dominion Cerealist, Dr. C. E. Saunders, announces a new wheat promises to become of great value in the more northerly sections of Canada as it ripens fully a week earlier than Marquis. This new wheat, which has been named «Prelude», is also a good yielder and very high in baking strength.

The Report of the Dominion Chemist, Dr. F. T. Shutt, is dealt with separately (i).

The Horticulturist, the Entomologist, the Botanist, and the Poultryman all present reports of the work done during the year in their respective branches.

The reports of the Superintendents of the branch farms and stations show special value to farms in the various provinces and districts as the work undertaken, in each case, is planned to study the problems of crop and live stock production.

Proposed Tropical University. — *Agricultural News*. Vol. XII, No. 282, 49-51, and 59. Barbados, February 15, 1913.

This article sets forth the great advantages which a Tropical University on the spot offers to colonists and gives the reasons which make the West Indies an especially suitable place for the establishment of such a University. In the same number of the *Agricultural News*, an article from the *Times* of January 23, entitled "The Case for a Tropical University" is given *in extenso*.

The Work of the Agricultural Association of Tunis. — *L'Association agricole, Bulletin Mensuel de l'Office du Gouvernement Tunisien*, Year VII, No. 63, pp. 23-24, 5, February 15, 1913.

The Agricultural Association of Tunis has been divided into two sections, owing to the extent of its field of operations and in order to give sufficient scope to its developing energy. These two sections are the Central Co-operative Society (Coopérative centrale), which deals with the business transactions connected with trade; and the Tunisian Farmers' Society (Société des Agriculteurs de la Tunisie), which is itself with technical agricultural questions. In 1912 the latter dealt with many important matters, such as the organisation of markets of the nature of exhibitions, the founding of insurance companies, and the use of mechanical power for ploughing.

See below, No. 474.

(Ed.).

So far, the Association has established 26 Agricultural Credit Banks of which the turnover in 1912 amounted to £ 95 360. It is proposed during the current year, to open 10 Agricultural credit Banks for maize each with 20 to 30 members. Three Breeders' Associations have been established at Beja, Munchar, and Medjez-el-Bab; while others are to be started in the near future. The question of the advantages of farm associations for mechanical ploughing and of the creation of Long-Club Societies requires further consideration. The Council of the Committee of the «Coopérative centrale» is also occupied with the important question of forming Associations for the purchase of manures and for the sale of cereals.

458 - **The Necessary Changes in the Organisation of the Procedure Relating to the Sub-division and Re-adjustment of Holdings.** - *FLAHR*: in *Deutsche landwirtschaftliche Presse*, Year XXX, No. 9, pp. 99-100. Berlin, January 29, 1913.

The writer wishes that the procedure relating to the readjustment of holdings should be altered in the following three important particulars:

- 1) The General Commissions should no longer, as heretofore, exercise legislative and executive powers, but that these functions should be entirely separate.
- 2) The execution of the designs should not be entrusted to a Special Commissioner (as a rule only a legal specialist), but should devolve by law upon the technical expert who surveys the land.
- 3) All the owners of property interested in the matter should have the right of a Public Company to negotiate a common loan.

459 - **The Formation of Horticultural Committees in the Prussian Chambers of Agriculture.** - *Zentralblatt der Preussischen Landwirtschaftskammern*, Year No. 9, pp. 63-64. Berlin, March 3, 1913.

A Ministerial Decree of January 28 advises the formation of Horticultural Committees in the Chambers of Agriculture in Prussia, and gives suggestions as to their composition and duties.

460 - Agricultural Shows.

Argentine Republic.

1913. Oct. 12-17. Corrientes. — Agricultural, Live Stock, and Industrial Show, organised by the «Sociedad Correntina de Hacendados».

Australia: New South Wales.

1913. July 17-18. — The Deniliquin Pastoral and Agricultural Society. L. Harrison, Secretary.
 Aug. 19-22. Wagga. — Murrumbidgee Pastoral and Agricultural Association. A. J. White, Secretary.
 Aug. 26-28 Gunnedah Pastoral, Agricultural and Horticultural Association. M. C. F. die, Secretary.
 Aug. 27-28. — Parkes Pastoral, Agricultural and Horticultural Association G. W. born, Secretary.
 Sept. 2-3. — Airlah Park Pastoral, Agricultural, Horticultural and Industrial Association. J. N. Taylor, Secretary.

- 2-3. — Wellington Pastoral, Agricultural and Horticultural Society. A. E. Rotton, Secretary.
 3-4. — Germantown Pastoral, Agricultural and Horticultural Society. J. S. Stewart, Secretary.
 3-4. — Junee Agricultural Association. T. C. Humphreys, Secretary.
 9-11. — Young Pastoral and Agricultural Association. T. H. Tester, Secretary.
 9-11. — Albury and Border Pastoral, Agricultural and Horticultural Society. L. Johnson, Secretary.
 16-17. — Cootamundra Agricultural, Pastoral, Horticultural and Industrial Association. M. T. Williams, Secretary.
 16-17. — Cowra Pastoral, Agricultural and Horticultural Association. G. S. Fisher, Secretary.
 23-24. — Murrumburah Pastoral, Agricultural and Industrial Association. J. A.oley, Secretary.
 30 Oct. — Hay Pastoral and Agricultural Association. Secretary, *G. S. Camden.

1911.

- 3 — June 1. Liège, Palais des Beaux-Arts. — International Documentary Exhibition of Ornithology, and of Entomology and Botany from an Ornithological Point of View. General Secretary: L. Cuisinier, 155 Rue de Bruxelles, Ans.
 13-23. Brussels, Palais du Cinquantenaire. — International Horse Show, organised by the Royal Horse Society of Belgium. Rue des Deux Eglises, 33, St. Josse-ten-Noode, Bruxelles.
 14-16. Ghent. — Temporary International Poultry Show at the Ghent Exhibition. For particulars apply to Boulevard de la Senne, 90, Bruxelles; or Chaussée de Bruxelles, 4, Ledeborg (Ghent).

1912.

- 5 - Oct. 15. Vichy. — International Exhibition. One section is devoted to agriculture and horticulture; others to machines and motors. For information apply to: Direction de l'Exposition Internationale, 18 Rue Scornin, Vichy.
 5. «Société Nationale d'Horticulture de France», 84 Rue de Grenelle. Shows arranged by the Society: June 12. — paeonies, irises, orchids; July 10 — roses, vegetables; Aug. 14. — gladioli, plants in bloom; Sept. 11 — dahlias, asters, fruit; Oct. 9 — early Chrysanthemums, orchids, fruit.
 6-9 Versailles, Park. — Exhibition of Horticultural Products, organised by the Horticultural Society of the Department of Seine-et-Oise. Apply to M. Hueber, General Secretary of the Society, 40, Boulevard du Roi, Versailles.
 9-15. Chambéry (Savoie). — Horticultural Show.
 9-15 Chambéry. — Interdepartmental Agricultural Show. This will include live stock, horticultural products, Savoy wines, agricultural machines, spraying machines, &c.
 12-15. Evreux. — Poultry Exhibition in the enclosure of the central Exhibition, organized by the Society of Norman Poultry Breeders (Société des Aviculteurs Normands), 9 Rue Josephine, Evreux (Eure).
 14-22. Grenoble (Isère). — Horticultural Exhibition.
 18-12. Paris. — Central Show of Stud Horses and Asses. Prizes will amount to 3,900 frs.; 17 cups, 464 medals. Apply to: «Ministère de l'Agriculture, Direction des Haras 2e Bureau».
 21-23. La Rochelle, Casino municipal — General Horticultural Show organized by the Horticultural and Viticultural Society of Lower Charente. President: M. Lebre, 4, Rue Réaumur, La Rochelle; Secretary, M. Morin, 57 Rue Alcide d'Orbigny, La Rochelle.

June 28 - July 6. Saint-Mandé (Seine). — National Exhibition of Horticultural Arts organized by the Horticultural Society of Vincennes. For particulars see the Horticultural Section, apply to M. E. R. Pacotto, President of the Organizing Committee, 11 Rue de la Marseillaise, Vincennes.

July-October. Brest, Place du Château — Exhibition of West France. Amongst there will be a section for Agricultural machines and Implements. Apply to: President de l'Exposition de l'Ouest de la France, Brest.

July 5-7 La Basée. — Annual Show of the Agricultural Comice of the Arrondissement of Lille. Apply for information to the Secrétariat général du Comice at: Paris, Lille.

July 12-14 Senlis (Oise). — General Horticultural Show organised by the Société ticulture de l'arrondissement de Senlis. For particulars apply before June Lelièvre, Secretary General of the Society, Senlis.

August 15-17. Montereau (Seine-et-Marne). — Fifty-first Show organised by the d'Horticulture de Melun et Fontainebleau. Apply to M. Zanotte, Secretary, l'Hôtel-de-Ville Montereau.

November. Paris. Twenty-fourth Show of the Société nationale d'Aviculture del Cold Storage Installation, Exhibition of the Automobile Club of France. The club, wishing to show the advantages accruing to farmers from the use of motor driven by explosion motors, has organised an annual competition, with prizes for the owners of the best plant. This competition will be held for the first time in the South-East region.

1913-1915. Show of Machines for cutting over coppices, organised by the Société des Jars de France, 8 Rue d'Athènes, Paris. A prize of 3000 frs. will be awarded after two competitions in 1913-1914. Date of entry: May 31, 1913.

1914. Jan. 18-19 Lille. — Fifteenth International Exhibition of the Poultry Breeds North. Secretary General. M. Emile Desreumaux, 92 Rue Franklin, Roubaix.

Germany.

1913. Oct. 7-12. Berlin. Exhibition Halls of the Institute for Fermentation Industries - Exhibition of Machines and Implements for the Brewing Industry, organised by the suchs und Lehranstalt für Brauerei of Berlin.

1914. Hamburg. Hamburg-Altona Central Cattle Market. — Show of Fat Stock. At the Geschäftsführenden Ausschuss der Hamburger Mastviehausstellung at burg.

Holland.

1913. May 9-22. Bellevue (neighbourhood of Amsterdam). General Exhibition of Ornamental Plants and Flowers. Secretary of the Exhibition, M. G. F. Koopman.

Italy.

1913. Aug. 15 - Oct. 15. Parma. — Exhibitions during the Celebration of the Centenary of Giuseppe Verdi. Floricultural Exhibition: Entries until May 31; apply to the « Ambulante di Agricoltura », Parma. International Exhibition of Dairy Machines Apparatus: opens Aug. 17. Provincial Exhibition of Butter and Cheese: Sept. 20. Also: Mechanical Ploughing Competition; Exhibition of the 4th Region; Farm Competition; Exhibition of Chemical Manures; Poultry and Show; Pork Butchers' Exhibition; Wheat Show.

June. — November. Bologna, Halls of the Provincial Agricultural Office, 15 Via gli. — Permanent Fruit Show organised by the Provincial Agricultural Office Bologna. In addition in order to encourage fruit-growing, the Office, with the sanction of the Ministry of Agriculture and various social bodies, is opening a course among fruit-growers in the province for new plantations.

-December. Bari. — Exhibition of Labour and Industry, and Agricultural Show.
Reply to the « Direzione dell'Esposizione del Lavoro e dell'Industria, Bari ».
petition among cooperative Dairies organised by the « Società Agraria di Lombar-
di », Milan, 2 Piazza Fontana; latest date of entry: June 30, 1913.

1st. Potenza (Basilicata). — Live Stock Show.

ber. — Live Stock Show of the Valsassina organised by the « Comizio agrario » of
o. Nov. 1-15 Florence. — Horticultural Exhibition (Chrysanthemums, Fruit, etc.);
y to the President of the Commission, 17 Via Bolognese, Florence.

2-November. Genoa. — Exhibition of Colonial Agriculture.

d Kingdom.

. 20-27. London, Royal Agricultural Hall. — Twentyfirst Annual International
Exhibition of the Grocery, Provision, Oil and Italian Warehouse and Allied
traders. Secretary, H. S. Rogers, Palmerston House, Old Broad St., London E. C.

4 of South Africa: Natal.

: 6-7. Vryheid. — Show organized by the Vryheid Agricultural Society.

e 20-21. Greytown. Show organised by the Umvoti Agricultural Society.

way.

der. Tacuarembó. — Second National Agricultural and Live Stock Show.

International Competition of identification marks for cattle, goats, sheep and pigs, or-
ganised by the Government of Uruguay. 27000 frs. are to be given in prizes and a
sum not exceeding 270.000 frs. is offered by the Government for the purchase of the
best system.

gricultural Congresses.

ria: Bosnia-Herzegovina.

jevo. — Sixth International Ornithological Congress.

ium.

7. Ghent. — International Congress of the Wine Trade, organised by the « Co-
mité International du Commerce des Vins, Cidres, Spiritueux et Liqueurs », 27 Rue
du Louvre, Paris.

3-2-3 Ghent. — International Congress for the Prevention of the Adulteration of
Food Stuffs.

1. 26. Ghent. — Eighteenth Chrysanthemum Congress on the Occasion of the Inter-
national Exhibition of Chrysanthemums and Fruit.

ice.

e 5. Périgueux. — First Congress of the National Union of the Horticultural Societies
of France.

ae 16-20 Paris International Forestry Congress.

t 4-12. Havre. — Congress of the French Association for the Advancement of Science

ia.

Petersburg. International Agrogeological Congress.

m.

1. 15-22 Madrid. — International Congress of Hydrology, Chimatology and Geology.

ñrid. — International Congress of Colonial Agrocnomy.

ñil. Madrid — Second International Soil Congress.

zerland.

y 6-9 Glaris. — Annual Meeting of the Swiss Forestry Association.

ñ. 4-7 Solothurn — Annual Meeting of the Swiss Forestry Association.

CROPS AND CULTIVATION.

462 - **The Conservation of Snow: Its Dependence on Mountains and Forests.**
 CHURCH, J. E., jun (Agricultural Experiment Station, University of Nevada);
Official Bulletin of the International Irrigation Congress, Vol. 1, No. 6, pp. 45-3
 Lake City, Utah, December 1912.

Mountain ranges not only receive more snow than plains or va but owing to the lower temperatures prevailing on their slopes, it for a longer period; they are, however, by their elevation, eq to sweeping winds which dissipate and evaporate the snow, so any means tending to break the force of the wind will also be conserve the snow, and render it available as an increased water to the plains and valleys during the summer. Crags are better breaks than trees and are found at higher elevations, but since area covered by them is small, it is important not to neglect the efficient substitutes.

In order to estimate the part played by forests in the conserv of snow on mountain sides, a system of surveys was begun in and the amount of snow was estimated at various points by mea a steel augur and a spring balance on which the amount of sn the augur could be read off as inches of water. The regions sh included both the semi-arid and wind-swept eastern side of the Nevada with the adjacent lowlands, and also the moister and sheltered basin of Lake Tahoe, where forests of varying types densities occur.

The following is an example of some of the measurements obt

		water content of snow in inches	
		March 1	April 1
Base of Mount Rose (5500 feet):			
Reafforested area thickly covered with young			
pines 30 feet high		5.5	—
Deforested area dotted with clumps of bushes		2.4	—
Typical sagebrush area		0.6	—
Summit of Mount Rose (10 800 feet):			
Unforested lee slope protected from the wind		35.1	37.9
Forested slope at the timber line		41.1	45.4

The figures show the value of trees in gathering and conserv the snow. At an altitude of 5 500 feet the timbered area had nine t as much snow as the sagebrush area, while higher up the mount side the forested slope had one-fifth more than the unforested lee above it, and the difference increased during the interval between two sets of measurements.

The type of forest also has a marked effect on the accumulation and conservation of snow:

rest of pine and fir with a maximum storage of 12.1 in. retained 0.6 in. on April 20			
forest	11.0	2.7	
ery dense fir forest	10.9	0.9	April 25
with glades	16.5	3.2	

a more open forest of pine and fir gathered more snow but retained an the pure fir forest, but evidently the density of foliage is not ly factor in the conservation of snow for in the second series of ements the presence of glades in the forest increased the storage to a considerable extent. The ideal forest would therefore seem a dense one with a maximum number of glades, whose area such proportions to the height of the trees that neither the or the sun can reach to the bottom. As to the kind of tree to i for elevations below 8000 feet, fir has given the best results, above that height mountain hemlock was most efficient. study has also been made of the increase in depth and density snow with elevation, and seasonal forecasts of the moisture stored mountains have been inaugurated which are of great value to gator and to the user of water power.

eteorology in Canada. - STUPART, R. F. (Director of the Dominion Meteorological Service) *Reprint from the Journal of the Astronomical Society of Canada*. March-8, pp. 75-87. Toronto, 1912.
ter a historical sketch of the origin and growth of the Meteorological in Canada, the writer gives an account of the present scope of k.

e headquarters of the Service are at Toronto, the present observ- and offices dating from 1909; there are also 543 other stations in mition at which observations are taken; and 41 of these send bi- legraphic reports to Toronto. The synoptic weather map has been l as a basis of weather forecasts and every effort has been made den the field from which observations are obtained, but as the tele- does not yet reach much beyond the southern margin of Canada ather map exhibits a vast blank to the northward, and cloud itions showing motion of the upper air are fragmentary and ble. Recently, through the co-operation of the United States r Bureau, a most promising development of the daily weather map m made possible by obtaining a certain number of foreign reports ws: Ireland, Faeroe Islands, London, Stornaway, Malin Head, d Bay, Shetland Islands, Cuxhaven, Vladivostock, Shanghai, Azores, Turks Island, Havana, Honolulu and Manila, together eral United States stations in Alaska, also 12 stations in Russia ria and one in Japan. These reports are received in Toronto at 0 a.m. and together with the reports of the American continent red on a map of polar projection and show with fair certainty istribution of pressure over the northern hemisphere. Within the years too, stations have been opened at 10 points in the north- ming a chain from Northern Alberta to the Arctic Sea, and

though at present their reports are transmitted by mail and they only serve to extend the isobars of the past month into high latitudes it is hoped that in the not distant future wireless stations will be in the far North, as reports from such stations would afford reliable data for the preparation of weather forecasts.

During 1911 balloons carrying the Dines Meteorograph went off with regularity, and of 21 sent up, 12 returned to the central with good records. The heights reached varied from 11.2 to 234 metres. The isothermal layer was found at an average height of 12, ranging from 16 km. on November 8 to 9.5 km. on December 7. The lowest temperature recorded was -70°C at 15 km. on September 9. A station has been established at Agincourt, and observations of pressure, temperature, humidity and wind direction in the free air have been obtained with fair regularity. The highest ascent yet made 2,408 m. (7900 feet) above sea level.

Newfoundland receives forecasts and storm warnings from the Canadian Service, but maintains her own Meteorological stations and publishes her own weather bulletins. It is expected that before long both the Canadian and the Newfoundland reports will be sent to England, where they will be of decided use to the British Meteorological Office.

There are at present 110 storm signal stations, 72 on the Atlantic and 32 on the Great Lakes. The percentage of verification of forecasts for 1911 was 86.1 and of storm warnings 91.7. Mariners and fishers pay close attention to storm warnings, while shippers of perishable goods consult the forecasts before shipping; moreover pilots of steamships, such as dredges and barges, at all times of the year of all vessels during the late autumn, allow themselves to be guided from port to port by the meteorological official.

464 - Application of the Ammonium Carbonate Method for the Determination of Humus to Hawaiian Soils. — RATHER, J. B. Texas Agricultural Experiment Station, College Station, Texas. — *The Journal of Industrial and Engineering Chemistry*, Vol. 5, No. 3, pp. 222-223. Easton, Pa., March 1913.

The ammonium carbonate method for the removal of clay from humus has given uniformly good results on a number of the soils of the United States, but on exceptional soils, like some of those of Hawaii, a slight modification of the method is necessary to remove the humus. The modification consists essentially in increasing the amount of ammonium carbonate to 2 gr. per 100 cc., and heating for one hour.

465 - The Intensity of Nitrification in Arid Soils. — STEWART, R. Contribution from the Chemical Laboratory, Utah Experiment Station, Logan, Utah, U. S. A. *Zeitschrift für Bakteriologie, etc. II. Abt.* Vol. 36, Nos. 19-25, pp. 477-490. February 15, 1913.

The writer discusses the common conception that nitrification takes place with great intensity in arid soils. The discussion of former

of Hilgard, of Headen and of the writer himself (1), leads to the following conclusions.

The conception that nitrification takes place with great intensity in arid regions rests primarily upon the observed fact that nitrates accumulate in great quantities in certain arid soils. These nitrate accumulations always occur in connection with other water-soluble salts, sodium chloride and gypsum. No nitrate accumulations have been observed in arid soils free from other water-soluble salts. The nitrates must therefore be intimately associated with the nitrates in two ways: 1st, they must exert a markedly favourable influence on nitrification; or 2nd, the nitrates, like the other alkali salts, are of marine origin. From the data presented, it seems that the latter conception is the correct explanation.

The nature of the material out of which many of the soils of Utah and Colorado are formed seems to indicate that the nitrate accumulations in these soils are undoubtedly of marine origin. The alkali occurring in the soils of Utah has been, in a large measure, deposited at the time of the formation of the shale; and, on the decomposition of this shale, the formation of the soil, the alkali has been incorporated with the soil. The passage of the water through the shale structure also carries out the soluble salts and carries them to the lower-lying land. The presence of the nitrates in the alkali soils of the arid belts, in connection with the possibility of injury arising therefrom, is of significance from several points of view. It is a well known fact that alkali soils, when they go before «going bad» produce a luxuriant growth of plants, which may be accounted for by the movement of the nitrates up to the surface of the plants, while a year or so later the salts become concentrated as to cause the death of the plants.

Arid soils are markedly poor in organic nitrogen, and yet the crops raised on them are excellent. The soils are not «nitrogen hungry». Hilgard has attempted to account for this apparent anomaly by the assumption that the small amount of humus in arid soils is relatively richer in nitrogen than the humus in humid soils, this fully compensates for the apparent deficiency in nitrogen. An appreciation of the tendency of nitrates, formed during the past ages, to accumulate in arid regions is offered as a better explanation of this fact, and as being not open to the theoretical objection that has been raised against Hilgard's assumption. The writer maintains that there is no reason to assume that the accumulation of nitrates in arid soil indicates a rapid bacterial action at present time; but that these accumulations indicate a concentration of nitrates already in the soil formed by slow bacterial action in remote past. The application of the irrigation water has simply provided a medium by which the nitrates may move, or be moved, from one place to another. This source of nitrogen affords a clear explanation

of the fact that in some cases the surface foot of cultivated and farm soils is richer in organic nitrogen than is that of the adjacent soils. The nitric nitrogen is obtained by the deep-rooted plants in the subsoil, converted into organic nitrogen by the plant, and added to the surface soil by plowing under of the straw. The writer, however, fully realises that there is the possibility of ammonification, nitrification, and even nitrogen fixation taking place, to a certain extent, in some alkali soils at the present time; but from the data presented he assumes that the great accumulations of nitrates found in alkali soils are of remote origin, being concentrated in their present position by the movement of the soil moisture.

Realizing fully that the term «alkali» must be so extended to include not only the carbonates, chlorides and sulphates, but also the nitrates of the alkali metals, and recognizing clearly the source of the method of nitrate accumulations in American arid soils, the writer believes one is in a position to work intelligently toward a solution of the problems presented by these unusual accumulations; and that the adoption of the methods of controlling the accumulations of nitrates on the surface as suggested by Hilgard over twenty years ago, such as mulching, tillage and proper drainage, will convert the nitrate problem into a blessing in disguise.

466 - Movement of Nitrates in the Soil (1). — ROUSSELLE, V.: in *Annales de Science Agronomique*, Year 30, No. 2, pp. 97-120. Paris, February 1913.

A confirmation of Schloesing's results that no appreciable diffusion of nitrate takes place in the soil, but that layers of nitrate are not displaced either downwards by percolation or upwards by the capillary current.

467 - The Effect of Toluol and Carbon Disulphide upon the Micro-Fauna of the Soil. — GAINES, P. L. From the *Twenty-Third Annual Report of the Missouri Botanical Garden*. Dec. 16, 1912.

The work presented was undertaken to determine whether the method advanced by Russell and Hutchinson (2) was adequate to explain the phenomena subsequent to partial sterilisation when applied to local soil.

The writer gleans from the literature the following evidences regarding such treatment.

(a) A temporary decrease in total number of bacteria present with a subsequent large increase: Krüger and Heinze, Massen and Pfeiffer, Hiltner and Störmer, Russell and Hutchinson, Hutchinson and Fred.

(b) An increase in oxidation: Fischer, Hesselink van Suchtelen, Darbishire and Russell.

(1) See No. 109, B. Feb. 1913.

(2) See No. 14, B. Jan. 1913; also RUSSELL, E. J.: Recent Investigations at B. March 1913 pp. 336-341.

(c) An increase in ammonification: Störmer, Scherp, Laidlow and Lipman, and Russell and Hutchinson.

(d) A detrimental effect upon nitrification: Warrington, Scherp, and Price, Perrand, Pfeiffer, Wagner, and Russell and Hutchinson.

(e) A beneficial effect upon nitrification: Brailles, Wollny, Pagnoul, Coleman, Lipman, Koch, and Fred.

(f) A detrimental effect upon nitrogen fixation: Störmer, Koch, and Behn, and Koch and associates.

(g) A beneficial effect upon nitrogen fixation: Kranskii, Heinze, and Fred.

(h) A detrimental effect upon denitrification: Wagner, Hiltner and Störmer, Lipman and Fred.

(i) In regard to the effect upon nodule organisms: Wollny and Richter believed such effect beneficial, while Perotti, Koch and Wirth held the opposite view.

In addition to the above, Hiltner and Störmer, and Russell and Lipman have studied with some care the flora, as a whole, prior to and subsequent to treatment; and they found that certain types were entirely and others indirectly beneficially affected. Russell and Lipman have also studied, more or less, the effect of such treatment upon the micro-fauna and, as a result, claim that all types of animal life with perhaps one exception, are totally destroyed. Fred studied various types of soil organisms in liquid cultures and found that the effect of certain strengths of various antiseptics stimulated development. The strength varied with different organisms and the stimulative effect diminished gradually from the maximum in both directions.

From the evidence brought forth in the experimental work the author draws as justifiable the following conclusions:

I. That small quantities of carbon disulphide, toluol, and chloroform, such as have been used practically and experimentally (0.01-20 %, and 0.2 %, when applied to the soils studied, exert a stimulative effect rather than a diminishing effect upon the total number of bacteria.

II. That an application of such quantities of carbon disulphide and toluol does not have an appreciable effect upon the number of protozoa present in such soils as have been studied.

III. That a very marked increase in yield may be noted following such an application when no evident change occurs in total number of bacteria present.

IV. That, in the light of the recent work of Koch, Egorov, Goodrich, and others, with results presented in this paper, the theory advanced by Russell and Hutchinson to account for the increased yield following the application of such chemicals, appears not tenable for such application.

A list of 40 references is appended.

- 468 - *Denitrobacterium thermophilum* sp. nov.: a Contribution to the Life-History of Thermophile Bacteria. — AMBROZ, A. and CHANVAT, J. M. bakteriologischen Institut der K. K. böhm. technischen Hochschule in Prag. — *Blatt für Bakteriologie, etc.*, II. Abteilung, Vol. 37, Nos. 1-3, pp. 1-16 + 3 figs. 1 plate. Jena, March 8, 1913.

A description is given of a new denitrifying bacterium, *Denitrobacterium thermophilum*, which has been isolated from the soil, and experiments concerning the nature of thermophilous denitrification, a process seems not to be confined to nitrates.

- 469 - Small Hill Reservoirs for Irrigation. — BRUTTINI, A. Laghetti e serbatoi costruiti in collina e collegati fra loro a gradinata, per l'irrigazione. — *L'Italia Agricola*, Year 4, No. 7, pp. 169-171 + 2 figs. Piacenza, 1911.

This paper deals with a series of reservoirs (at present three) constructed by Prince di Lucedio, Carrega, on his estate Casino de' B. near Sala Buganza, Parma, Italy.

The principle on which these constructions are designed is adopted in all countries where arable lands in the plains are near mountains.

Every hill or mountain is furrowed by small valleys in which rain water flows, and as such valleys in some places wider and others narrow, the plan was adopted of erecting successive barrages at the narrowest points of the valley, thus forming as many small artificial lakes, the arrangement of which, save for their greater dimensions, is the warping by steps as it is practised in Tuscany and in other countries for filling up ravines.

The base of every barrage is traversed by a cast-iron pipe run with a vertical sliding gate. Provision is also made for surface overflow. The valley acts as a canal between the successive reservoirs, the last of which supplies the water for irrigation, and is replenished by the upper ones. Thus the separate reservoirs are together equivalent to a large one, but have the advantage of costing much less to build and keep up.

As for the technical and economical details of the work done, it may be stated that the first reservoir built contains 494 000, the second 15 000 and the third 742 000 cubic feet of water. The latter will be fed by three higher reservoirs, one of which is already being built and will contain 3 108 000 cub. ft. The cost price per 100 cubic feet of capacity for the various reservoirs is the following: 1s 7d for the first reservoir, 1s 1d for the second, 1s 1d for the third and 1s for the fourth.

The dams are made of rammed earth laid in layers about 12 inches high, and watered, whilst being rammed, with lime water so as to get a cohesion between the particles of earth and greater impermeability to water. The base of the inner slope of the dam is twice the height of the latter, the base of the outer one being 1.5 times the height. The height at the top corresponds to the formula $3 + \frac{5}{17}(h-3)$. The dam is sunk into the ground to a depth of 6 feet.

Ponzi, the engineer of work, states that these reservoirs have to fear from silt, because the water that reaches them is clear, as it does from catchment basins (about three-quarters of a square mile) covered with woods and pastures. Should it, however, be necessary to clear the bottom of the reservoirs, it can be done by allowing the water to run under a head of 6 feet and if necessary the mud could be previously removed.

The amount of water available in the reservoirs from the middle of the end of June is 5 933 000 cub. feet. This quantity distributed during the times in July and August amounts for each irrigation, lasting 12 days, to 1 483 250 cub. feet, to which 0.42 cub. feet per second of water must be added, bringing the total available for each irrigation to 1 995 410 cub. ft.

The following data refer to the construction and cost of the reservoirs:

Name of Reservoir	Dam				Reservoir			Cost
	Height	Dimensions at top		Volume	Length	Area	Capacity	
		Breadth	Length					
Lower (1904-05)	16 4	11 6	210 0	109 400	689	—	494 000	396 10
Upper (1907-10)	28 6	16 5	203 5	240 150	853	107 640	1 589 000	793 0
del Rio Montempo (12)	26 3	13 1	147 7	137 700	722	49 514	742 000	396 10
del Rio delle Navi (1912-13) . . .	49 2	19 8	282 2	741 600	1 181	139 932	3 108 000	1 586 0
Totals . . .							5 933 000	3 172 0

The price at which the water is sold is valued for all the reservoirs at £7d per hour, owing to the considerable increase that has taken place in the growing of irrigated forage crops and of tomatoes. This price could even be raised if the water were to be used at times out of regular succession and for industrial purposes.

	£	s	d
Considering the net returns at	436	2	8
and deducting for interest on capital employed	158	11	11
there remains net	277	10	9

allows of all the expense being amortized in only 10 years.

- 470 - **Irrigation Experiments in Brandenburg, Germany.** - AUGSTIN, E. H. *Landbauversuch.* - *Illustrirte Landwirtschaftliche Zeitung*, Year 33, No. 112-113, Berlin, February 15, 1913.

A detailed description of the experimental installation of irrigation works in 1911, by the Chamber of Agriculture of the Province of Brandenburg in the exploitation of Jüterbog, the Property of Hr. Bohm-Kaltenhausen. The cost and the profit of the installation are given as well as the excellent results which have been obtained.

- 471 - **Field Records relating to Subsoil Water.** - MC GEE, W. G.: *U. S. Department of Agriculture, Bureau of Soils, Bulletin 98*, pp. 40. Washington, February 1913.

In the semi-arid regions of the United States which have been made productive by the adoption of the dry-farming system, large yields of crops are obtained with an apparently totally insufficient moisture supply in the shape of an annual rainfall of 15 inches; and the present bulletin sets forth the result of an enquiry into how far this insufficient rainfall is supplemented by an underground water supply.

In South Dakota the soils are derived from the underlying clay shales, and where the latter are exposed in wells, railway cuttings, they are moist almost to the point of saturation, and the moisture increases uniformly with the distance from the surface, suggesting a subterranean rather than a superficial source of supply. The whole district may be looked upon as an artesian area with a catchment area on the West Slopes of the Rocky Mountains, whence the Dakota sandstone conveys water to South Dakota, the water gradually leaking into and through the overlying clays and shales. The rate of percolation and seepage can only be accurately stated pending systematic observation, but it has been provisionally estimated at over 12 inches per annum - sufficient to supplement the 15 inches of rainfall and produce an abundant crop.

Another portion of the Region of the Great Plains was studied in South-Western Kansas, and a detailed description of the ground-water condition is given. The conclusion is drawn that the district is underlain by a reservoir of moisture flowing eastward, and derived both from local rainfall and from catchment on the mountains or higher parts of the plains. The water table occasionally comes to the surface and gives rise to perennial streams and permanent ponds, but though within reach of the surface by capillary movement, it usually lies at an average depth of 30 feet, and may be considerably lowered by excessive use. A provisional estimate was made that 6 to 8 inches of water per annum would be available from the underground supply and be available for plant growth.

It would be difficult to overestimate the importance of these results for the areas where the subterranean movement and supply of water indicated coincide with those where dry-farming has been most successful, and it may be inferred that there is a close connection between the two phenomena. Moreover, if this be the case, it will also explain why the system yields such far less satisfactory results when applied to other parts of the world where different geological conditions obtain.

periments in Subsoiling at San Antonio. — HASTINGS, S. H. and LETTEER, L.: in *U. S. Department of Agriculture, Bureau of Plant Industry, Circular 114*, 7-14. Washington, February 1913.
periments were carried on for three years in a semi-arid region to estimate the value of subsoiling to the crops. In no instance difference in yield significant, nor was the moisture content of the soil increased.

dry Farming. — HENDERSON G. S.: in *The Agricultural Journal of India*, Vol. VIII, 1, pp. 41-46. Pusa, January 1913.
general survey of the dry-farming conditions in the semi-arid States of the United States, with a discussion of how far the system can be applied to similar regions in India.

Nitrogen-Enrichment of Soils: Clover as a Manurial Agent. — SHUTT, F. T., 1 of the Dominion Chemist. — *Appendix to the Report of the Minister of Agriculture, Experimental Farms, Reports for the Year ending March 31, 1912*, pp. 139-171, 46) + fig. 1. Ottawa, 1912 (1913).
article describes an experiment instituted to determine by analysis of the soil the amount of nitrogen that might become available through continuous growth of clover, the soil at the outset poor one.

plot set apart for this work was, in the early spring of 1902, to a depth of 8 in, and the excavation filled in with a well-mixed, sandy loam; the subsoil was sand. At the outset the plot was with superphosphate at the rate of 400 lbs. and muriate of potash at the rate of 200 lbs. per acre; no nitrogen was given, but the soil was with a solution of "nitragin"; lime at the rate of 1 ton per acre worked into the soil in the spring of 1909, as the plot was showing signs of sourness.

The first seeding of red clover was made in the early spring of 1902; a very fair catch obtained; the plot has been in clover continuously since that date; the crop was cut as occasion seemed to require throughout the season, the plants not being allowed to go to seed, and the soil was allowed to decay on the soil; every second year, the plot was mowed over and resown. From time to time, the soil has been sampled and nitrogen-content determined; the results are tabulated as follows:

Nitrogen-Enrichment of Soil due to the Growth of Clover.

	Date of Collection	Nitrogen	
		Percentage in Water-free Soil	Lbs. per acre to a depth of 4 in.
Before experiment	13-V-02	0.0437	533
After 2 years	14-V-04	0.0580	708
" 4 "	15-V-06	0.0608	742
" 5 "	30-V-07	0.0689	841
" 6 "	23-V-08	0.0744	908
" 7 "	4-V-09	0.0750	915
" 9 "	5-V-11	0.0824	1005
" 10 "	22-V-12	0.0856	1044
Increase in nitrogen due to 10 years' growth		0.0419	511

During the 10 years of the investigation, the soil gained, simply the growth of clover, on an average 50 lbs. of nitrogen per acre or had doubled its nitrogen-content. The value of these data, obtained under conditions considered too unfavourable or disadvantageous for fitable farming, is obvious. The inevitable losses in humus and nitrogen consequent upon the necessary cultivation of the soil when growing other than those which put the land in sod, are also discussed, in view of emphasizing the necessity for the adoption of a rotation which includes the periodic growth of clovers and grasses.

475 - **The Effect of Sulphate of Ammonia on Phosphatic Manures used for Cereals.** MITSCHERLICH, E. and SCHNEIDER, W. Mitteilungen aus dem landw. Institut der Universität Königsberg, Abteilung für Pflanzenbau. — *Die Landwirtschaftlichen Versuchsstationen*, Vols. LXXIX and LXXX, pp. 71-96 + fig. 4. Berlin, 1913.

This article describes experiments on the solubility of bicalcic and tricalcic phosphates on the addition of other salts, and especially of ammonium sulphate (I), and pot-culture experiments with oats (II).

I. — 2 gr. each of bicalcic and of tricalcic phosphate were shaken up for 10½ hours, at a temperature of 30° C., with one litre of the water through which a current of carbon dioxide was kept running. The operation was carried out in Mitscherlich's apparatus (Rührapparat). To a certain number of bottles were added at a given time equal amounts of various salts, as shown in the following table, which gives the results of the experiments:

Substance employed	Phosphorus pentoxide dissolved	Increase (+) or decrease (-) produced by the addition of the various salts	
		%	%
2 gr. bicalcic phosphate		18.00	—
" " " + 10 gr. ammonium sulphate		29.51	+ 11.51
" " " + 8.1 " " chloride		26.51	+ 8.51
" " " + 10.76 " sodium sulphate		30.68	+ 12.68
" " " + 13.02 " calcium (gypsum)		13.67	- 4.33
" " " + 26.16 " magnesium sulphate (hydrated)		28.12	+ 10.12
2 gr. tricalcic phosphate		7.16	—
" " " + 13.2 " calcium sulphate (gypsum)		5.30	- 1.86
" " " + 10 " ammonium sulphate		14.44	+ 7.28

the amount of phosphorus pentoxide dissolved was only diminished by the action of calcium sulphate; all the other salts increased it, especially ammonium sulphate. It is very probable that this property of increasing the solubility would also be shown, though to a less extent, during experiments, since it has already been found that the application of ammonium salts greatly promotes the assimilation of slightly insoluble phosphates. It may therefore be concluded that the use of these salts would increase the yield, when the factor phosphorus pentoxide is present in a relatively minimum proportion.

[— In the pot-culture experiments, when the other nutritive elements were present in a soluble condition and in sufficient quantity, the addition of about 16 gr. of soluble salts per 6100 gr. of sand per acre increased the solubility of the phosphorus pentoxide present in the same quantity; the minimum of calcium compensated for by the action of gypsum was 3 gr. in the case of bicalcic phosphate and 1 gr. in the case of tricalcic phosphate. The addition of only 0.5 gr. of ammonium sulphate brought about a further increase of the crop and a larger assimilation of phosphorus pentoxide. At the same time, the addition of excess of ammonium sulphate as compared with the amount used in practical agriculture caused injury to the vegetation.

On the other hand, the addition of sulphate of ammonia after a treatment with superphosphate and basic slag produced no increase in the solubility of phosphoric acid by the oats; and in a loam soil, susceptible of phosphatic treatment, it did not increase the solubility of the phosphoric acid present, nor indeed hinder the degradation of the soluble phosphoric acid given as a manure.

The writers propose, in future experiments, to eliminate the action of nitrogen, as well as the acid chemico-physiological reaction of the soil in question, thereby isolating the solubility phenomena and their

The Soluble Silicate Acid in Basic Slag and Its Influence upon the Determination of Citric-Soluble Phosphoric Acid. — POPP, M. (Ref.), CONTZEN, J., OPPER, H. and MENTZ, H.: in *Mitteilung der landwirtschaftlichen Versuchs-Stationen*, Bd. LXXIX and LXXX, pp. 229-278, Berlin, 1913.

The writers attribute the difficulties in the analysis of basic slag to the lack of an accurate knowledge of its chemical composition. They are in the belief that the precipitation of the so-called "injurious" phosphoric acid should be attributed to a deficiency in soluble iron. If, on the contrary, there is a large amount of the latter present, the colloidal phosphoric acid remains in solution in the alkaline liquid. The precipitation of ferrous sulphide, due to the addition of ferric citrate, can be prevented by the addition of a weak oxidizing agent.

The writers therefore propose the following method: to 50 cc. of the extract should be added 25 cc. of ferric citrate solution, 10 cc. of distilled water at 0.3%, and 25 cc. of magnesia mixture. The article contains detailed directions, comparisons with other methods, and in conclusion, deals with the analysis of Wolter phosphate.

477. - **The Value to Plants of Potash Derived from Felspars.** — BLANK
Arbeit aus dem agrrikultur-chemischen Institut der Universität Breslau, *Journal
Landwirtschaft*, Vol. XLI, Part I, pp. 1-10. Berlin, 1913.

Analyses and culture experiments. The writer gives further evidence that mica is a better source of potash than felspar; and concludes that the facility with which the latter decompose, thus supply potash to plants, is in direct proportion to their potash and soda content.

- 478 - **The Fertilizing Action of Sulphur (1).** — DEMOLON, M. A.: in *Comptes
des Séances de l'Académie des Sciences*, Vol. 156, No. 9, pp. 725-728,
March 3, 1913.

More experiments showing that sulphur is converted into a sulphate in the soil, and that the phenomenon is of a biological nature. Further that its fertilizing action is due partly to its effect on the bacteria, and partly to the chemical properties of the sulphuric acid which is formed gradually and which not only supplies sulphur to plants but also helps to dissolve mineral elements in the soil.

- 479 - **The Relative Manurial Value of Nile Water and Sewage.** — LUCAS
The Cairo Scientific Journal, Vol. VII, No. 76, pp. 1-9. Giza, Egypt, January 1913.

Sewage in Egypt may be looked upon as Nile water enriched with special plant foods that are deficient in the soil, and therefore in a less climate its application to the soil forms an ideal method of fertilization.

- 480 - **Manuring Experiments in German East Africa.** — Bericht über
Deutsch-Ostafrika aus Mitteln des Kali-Propagandafonds im Jahre 1911-12:
führten Düngungsversuche. — *Düngungsversuche in den Deutschen Kolonien* (ed.
by the German Imperial Colonial Office), pp. IV + 71. Berlin, 1913.

A resolution adopted on April 3, 1911, by the German Imperial Parliament provided that a part of the funds voted for the furtherance of the consumption of potash salts should be devoted to manuring experiments in the German colonies. This preliminary report contains the first data collected by the Government agricultural consulting stations of German East Africa.

The question of the use of manures in German East Africa arises owing to the supposed abundance of nutritive substances in the soil and to the continuous character of the principal cultivated plants (palms, coffee, sisal, etc.), considered analogous to that of European trees.

It is as erroneous to consider the soils of German East Africa rich as it is to consider them the reverse. In reality there are both rich and poor soils, with a prevalence of medium soils, on which it is not possible to grow for a length of time growing impoverishing crops. Consequently the problem of returning plant food to the soil must be faced.

(1) See No. 234, B. March, 1913.

following three analyses are characteristic :

	Humus — per cent.	Lime — per cent.	Nitrogen — per cent.	Potash — per cent.	Phosphorus pentoxide — per cent.
11.	0.57	8.12	0.10	1.45	0.11
7 soil	0.06	0.01	0.04	0.20	0.03
.	0.10	0.20	0.06	0.30	0.05

also to be remembered that the heat and moisture of the tropics in active decomposition of the nutritive substances, and that, in light soils, these get washed out by the violent tropical rains. growing annual and perennial plants together leads to an intense siltment of the whole soil. Thus, farming based on manuring is a necessity, save for the most favoured localities, and as the generation of farmyard manure is impossible, artificials must be resorted to with the exception of cases in which green manures are used. As it is difficult to be followed, an analysis of the soil is no sufficient guide, and experiments in the various estates must be made, considering also the cost of manuring under the proposed conditions. It is considered in order to secure fairly reliable data the experiments must be conducted for five years in an absolutely uniform manner.

The experiments which were started in 1911-12 on private plantations and which included : 14 for rubber, 7 for coffee, 1 for cacao, 14 for sisal, 16 for cotton, 10 for maize, 4 for cereals, 6 for lucerne, 7 for pastures, 4 for vegetables and 2 for beans, at the Government Experiment Stations 3 for cotton and 3 for maize, the scheme of at least five series of plots, the so-called differential manuring, based on Liebig's law of minima, was followed :

- . Not manured.
- . Phosphoric acid + nitrogen.
- . Phosphoric acid + potash.
- . Nitrogen + potash.
- . Phosphoric acid + potash + nitrogen.

The fertilising elements were applied under the form of chloride of potash containing 56.8 per cent of potash, of double superphosphate containing 40 per cent. of phosphorus pentoxide, and of sulphate of ammonia containing 25 per cent. of ammonia.

A suitable set of plots in six series may be arranged as follows :

3	5	7	9	11	2	4	6	8	10	12
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I. On one line.

1	3	5	7	9	11
8	10	12	2	4	6

II. On two lines.

Lastly the following doses are recommended:

Crop	Area of plot	Chloride of potash	Double super-phosphate	Sol am
	acre	lbs.	lbs.	
Cotton	$\frac{1}{4}$	33	66	88
Maize and tobacco	$\frac{1}{8}$	22	22	44
Cereals and rice	$\frac{1}{8}$	16 $\frac{1}{2}$	33	33
Potatoes and beets	$\frac{1}{8}$	16 $\frac{1}{2}$	22	44
Beans	$\frac{1}{8}$	16 $\frac{1}{2}$	28 $\frac{1}{2}$	23
Vegetables	$\frac{1}{40}$	3 $\frac{1}{4}$	4 $\frac{1}{2}$	8
Coffee (1 to 3 years)	$\frac{1}{8}$	11	22	22
» (3 years)	$\frac{1}{8}$	17 $\frac{1}{2}$	33	33
<i>Manihot Glaziovii</i> (under 2 years)	$\frac{1}{8}$	11	22	22
» (2 years old)	$\frac{1}{8}$	16 $\frac{1}{2}$	33	33
Kapok (under 3 years)	$\frac{3}{8}$	22	44	44
» (3 years old)	$\frac{3}{8}$	33	66	66
Coconut and oil palm (under 5 years)	$\frac{1}{4}$	15 $\frac{1}{2}$	31	31
» (5 years old)	$\frac{1}{4}$	12	44	44
Cacao	30 plants	3 $\frac{1}{2}$ oz	5 $\frac{1}{2}$ oz	11
Sisal	$\frac{1}{4}$ acre	33 lbs.	44 lbs.	44
Fruit trees and vines	5 plants	3 $\frac{1}{2}$ oz	3 $\frac{1}{4}$ oz	6
Pasture	$\frac{1}{4}$ acre	22 lbs.	22 lbs.	66
Clover, lucerne	$\frac{1}{8}$ »	15 $\frac{1}{2}$ »	31 »	5

The paper reports the results obtained the first year, from no conclusions can as yet be drawn; the programme of the experiment to be carried out in 1913 is given. The appendix contains further technical instructions for carrying out the experiments and the form the tables of results.

Soil Improvement near Rome. DE ANGELIS D'OSSAT, G.: in *Atti della Accademia dei Lincei*, Year CCCX, Vol. XXII, Part 4, pp. 246-252. Rome, January 16, 1913.

This is a report upon laboratory experiments conducted with a view to finding the best admixture for «pozzolanella» soils (namely the upper part of pozzolana), which are frequent in the Roman Campagna. The rate with which water ascends in these soils, their capacity for water and their rate of drying were determined. The same determinations were made for earthy tufa (often lying under pozzolanella), for marl from the Tiberian hill, for mixtures of pozzolanella and tufa, pozzolanella and $\frac{1}{4}$ by volume) and pozzolanella, tufa and marl. It was found that marl is much more effective than earthy tufa in rendering pozzolanella less permeable to air, cooler and capable of retaining moisture.

But only field experiments will prove if the admixture of marl to pozzolanella soils intended for meadows will be economically advantageous, and if so, to what extent.

Causes affecting the Loss and the Retention of Water Vapour by Plants. -

CLERC DU SABLON: - in *Revue Générale de Botanique*, Vol. 25, Nos. 290 and 291, pp. 49-83 and 104-122. Paris, February 15 and March 15, 1913.

While authorities have differed greatly as to the degree of importance attributed to various factors influencing transpiration, such as light and temperature, the phenomenon has been considered in most cases to be intimately connected with the presence of chlorophyll, and the variations observed in the rate of loss of water vapour under different conditions have been ascribed to purely physical causes. But physical causes are insufficient to explain the results obtained, and some internal biological causes must be considered as well. Of these the chemical condition of the cell-sap may play some part; but the variations are small that they could produce but little effect on transpiration, and the author was led to examine with special care the permeability of cell membranes.

Starting with some preliminary experiments on the transparent filaments of *Elodea*, filaments of *Spirogyra*, and thick sections of ivy leaves, he determined the permeability of the protoplasmic membranes of the cells to the penetration of weak solutions of eosine. He found that this varied with the temperature and with the light intensity. This accounts for the usual acceleration of the transpiration process in plants exposed to direct sunlight or to high temperatures; but any factor which would tend to contract the protoplasmic membrane, independently of the external conditions, would also render it less permeable to transpiration. This fact was verified 1) by exposing some ivy leaves to the rays of the sun for 10 minutes, and 2) by placing them to absorb solutions of high osmotic power and then placing them in water and comparing them with other leaves. The stalks had been dipping in water all the time. In both cases the rate of evaporation of the treated leaves was considerably

less than that of the untreated leaves, though all the external conditions for the two sets of leaves remained the same.

Anæsthetics, such as ether and chloroform, also had a preliminary retarding effect on transpiration both in light and in darkness; this was followed by a gradually increasing loss of water vapour, corresponding to the setting up of pathological conditions in the cells by the anæsthetic; as the cells died the membranes lost all power of withholding water.

The relation between transpiration and the presence of chlorophyll was studied by comparing the green and the colourless leaves of variegated plants under different conditions of light and heat. Leaves in sunshine, in diffused daylight, or in higher temperatures, all lost more water vapour than similar leaves in the shade, in darkness, or in lower temperatures respectively, but the ratios of the losses were approximately the same whether chlorophyll was present or not. And though the leaves showed themselves rather more sensitive than the colourless leaves to variations in the external conditions, the fact that all the leaves behaved in the same general way proved that the presence or absence of chlorophyll could not be the controlling factor in transpiration.

Lastly, a study was made of transpiration in succulent plants. In such plants water vapour is emitted only from the peripheral parenchymatous cells lying immediately below the epidermis, and in order to further reduce transpiration the membrane of these cells is almost impermeable, so that variations in temperature and light have a greatly reduced effect.

483 - **The Effect upon Plants of Boron Compounds** (1). - HASELHOF, E. Bericht über die Versuchsstation in Harlesshagen (Kreis Kassel). *Die Landwirtschaftlichen Versuchsstationen*, Vols. LXXIX and LXXX, pp. 399-429, + table. Berlin, 1913.

A critical review of the literature existing on this subject, based on experiments in growing maize and French beans in solutions, and on oats in soil.

The writer comes to the following final conclusions:

1. Hotters' observations as to the formation of spots on the leaves as a result of the action of boron are confirmed; these spots occur only with a minimum quantity of boron in the solution in the soil, and a injurious effect upon the yield has been recorded.

2. The injurious effect of boron is clear; the upper limit of boron in solution is probably 1 mg. per litre; this amount as borax increases the yield of French beans, though it had a bad effect on the yield of the plants; under the form of boric acid, it had injurious effects on the yield also; larger amounts were decidedly harmful; 1.15 mg. of boron per litre of nutritive solution had also clearly injurious effects on the yield.

In cultures in soil, 1mg. of boron in 8 kg. of soil, i.e. 0.00001 per cent. had no bad effect upon the beans when applied in the form of borax, although it was injurious in the form of boric acid; in every case larger quantities were harmful. The preceding experiments suggested higher

Some experiments, however, seemed to show a favourable influence upon the bulk of the crop, which is to be attributed to the stimulant action of these substances; but the limit for this beneficial action is 0.00001 per cent. of the soil.

Although some experiments have shown that the action of boric acid was more injurious than that of borax, further experiments are necessary to decide whether this was due to the idiosyncrasy of special species, as in general the effect of the two compounds is equal.

The assimilation of boron, whether from solutions or from the soil, usually depends upon the amount present; it appears to be deposited in the stems and not in the grain.

Although the exterior effects shown by the spots on the leaves are alike in different plants, the action upon the yield was different; the discrepancies between the results of present and former experiments may be attributed to this fact.

Solanum Chimeras. — MARCHAL, E.: in *Annales de Gembloux*, Year 23, No. 3, 127-129. Brussels, March 1, 1913.

Winkler (1) has shown that when reciprocal grafts of nightshade and tomato are cut back to the point of union, composite buds may develop into individuals exhibiting a curious mixture of the characters of the two associated species.

During 1912 the writer repeated Winkler's experiments at Gembloux, seeing as follows: nightshade (*Solanum nigrum* var *guineense*) and tomato (*Solanum Lycopersicum*) plants were raised from seed sown in early spring, the plants being hardened off as much as possible before the end of April. The stem of the tomato was then cut 15 to 20 cm. (6 to 8 in.) above the earth level, leaving 4 or 5 leaves on the plant. The stems of nightshade were cut in the shape of a wedge not less than 3 cm. (1 in.) long, and all the leaves were removed. The wedge-shaped stem was then fitted into a corresponding v-shaped cut in the tomato plant, the two were bound together. After 15 to 20 days the tissues were completely united, and a transverse cut then made about 1 cm. (0.4 in.) above the top of the stock, leaving a rectangular piece of nightshade fused

(1) H. WINKLER: Ueber Propfbastarde und pflanzliche Chimären (*Ber. d. D. Bot. Ges.*, Bd. XXV, H. 10, 1907).

(2) *Solanum tuberosum*, ein echter Propfbastard zwischen Tomate und Nachtschatten (*Ber. d. D. Bot. Gesellschaft*, Bd. XXVI, H. 8, 1908).

(3) Weitere Untersuchungen über Propfbastarde (*Zeitschr. f. Botanik*, Bd. I, H. 5, 1909).

(4) Ueber die Nachkommenschaft der *Solanum* Propfbastarde und die Chromosomenverhältnisse ihrer Keimzellen (*Zeitschr. f. Botanik*, Bd. II, H. 1, 1909). (Author's note).

into the tomato stem. A large number of adventitious buds were immediately formed round the top of the cut stem, and in almost all they presented either pure tomato or pure nightshade characters according to their position; but amongst the 30 plants under observation three cases of chimera were obtained. Where they occurred the shoots were removed so that the monstrous shoots should benefit the entire vigour of the plant, and they developed into forms such as have been described by Winkler.

One, belonging to the so-called sectorial type, appeared to be of the longitudinal fusion of the two species, for on one side of the plant the leaves were all pure tomato, while on the other they were pure nightshade, and the line of demarcation was sharply defined down the stem; in the one or two cases where leaves sprang from the point of fusion of the two sides of the stem, these leaves were of a type along the mid-rib, on one side reproducing tomato, and on the other nightshade characteristics. At a certain height, the stem split into two constituent parts which then dissociated completely. The right side flowered and fruited profusely, but the organism died before the left side had developed any flowers.

On another plant, there arose two buds in such intimate contact that they appeared to spring from a common origin; as the stem was dying a cutting was made of the buds, and later, the two individuals were separated. They both belonged to the pericloral type of chimera, and one of them resembled the *Solanum Kohlreuterianum* of Winkler. In general appearance the plant was very like a tomato, but the leaves were more simple, and the plant was glabrous. It did not, moreover, possess the aroma of the tomato. Flower buds were formed, but did not open, and the luxuriance of the vegetation was marked. The two buds as well as a single bud on yet another plant, developed into the *Solanum Gaertnerianum* of Winkler. The leaves were simple, very irregular in shape and surface, almost glabrous, and without the aroma of the tomato. The apices all tended to curve over, causing a kind of twist of the stem, and the intensity of the colour often varied between the depressed and raised portions of the surface. The whole appearance suggested a lack of harmony between the two symbiotes, and this was borne out by the physiological side by a great lack of vitality. No flowering took place, but Winkler obtained flowers and seeds from his specimens and thus reproduced pure nightshade plants.

Cuttings were made of all these chimeras, and will be submitted to further experiments during the present season.

485 - On Some Vegetative Anomalies of *Trifolium pratense*. - KAJ
in *Zeitschrift für Induktive Abstammungs- und Vererbungslehre*, Vol. 9, Part
pp. 111-133 + 8 figs. and 1 plate, Berlin, February 1913.

The writer speaks of the fasciation and yellowing (chlorosis) of
in red clover and finds a connection between these two phenomena.

Self Coloured and Violet Seeds of *Pisum arvense*. — KAJANUS, BIRGER: in *Landwirtschaftliche Zeitung*, Year 62, Part 5, pp. 153-160, Stuttgart, Jan. 1, 1913.

From a variety of field pea (*Pisum arvense*), whose seeds were grey with violet spots, is derived a variety in which the violet colour is continuous over the whole or part of the integument, or is present in the form of stripes. For the latter variety the writer proposes the name *striatum*. The violet colour is due to a pigment dissolved in the cells of the palisade layer. From his cultures and observations (1909-1911) the writer concludes that: 1) the appearance of the violet coloration on the entire integument of the seeds of *P. arvense*, is a modification, especially in spotted varieties; 2) this modification arises spontaneously, and is not due to any special external influence; 3) the frequency of the occurrence of self-coloured violet seeds can be increased by the separate sowing of such seeds.

Influence of Green Manuring upon Germination of Seeds. — Report of the Director, 1911-1912, University of Wisconsin Agricultural Experiment Station, pp. 26-27, Madison, Wisconsin, January 1913.

In 1911 a southern student at the Wisconsin Agricultural College noted the failure of some ten acres of cotton to germinate, where it had been sown immediately after ploughing under green clover. On the other hand, on a similar field planted with the same seed, but which had not been green manured, normal germination occurred. Professor Mann has accordingly begun a study of the effect of green manuring upon the germination of seeds subsequently sown. In pot tests in the greenhouse he has incorporated with the soil an amount of green manure corresponding to that applied under field conditions, and has then sown various seeds, in all cases sterilizing one series of pots, while the other was allowed to remain in a normal condition.

It has been found that the decomposition of the clover somehow affects the cotton seed, but does not have any material effect on the germination of corn [maize], wheat, and clover. Two experiments conducted with flax have, however, shown a similar detrimental effect that is produced on cotton. The results so far secured indicate that the decomposition of green manures results in the reduction of the oxygen supply and an increase in the carbon dioxide present in the atmosphere. It is thought that this change in gaseous content of the soil prevents the germination of the cotton and flax seed, which contain a high percentage of oil, and so require more oxygen for germination than such seeds as corn, clover, and wheat."

Effect of Fertility upon Variation and Correlation in Wheat. — MYERS, C. H. *Proceedings of the American Breeders' Association*, Vol. 7, pp. 61-74. Washington, 1912.

A summary of the results obtained by other experimenters in this field is followed by an account of the writer's own work on a mixed pop-

ulation of Dawson's 'Golden Chaff'. His results indicate that variability is greatest on the poorest soil, but more data must be accumulated before any definite conclusions can be drawn.

489 - **Xenia in Wheat.** - BLARINGHEM, L.: in *Comptes rendus de l'Académie des Sciences*, Vol. 156, No. 10, pp. 802-804. Paris, March 10, 1913.

Cases of xenia were observed in wheat when 1) *Triticum durum* and 2) *Triticum turgidum gentile* were used to pollinate *T. vulgare tesdens*. The hybrids of the second cross exhibited characteristics accentuated than those of either parents and a hybrid-mutation appeared to have occurred.

490 - **Heredity of a Maize Variation.** - COLLINS, G. N.: U. S. Department of Agriculture, Bureau of Plant Industry, Bulletin No. 272, pp. 23, Washington, January 1913.

During the harvest of 1909, a single white ear of corn was observed in a field of Yellow Dent maize at Waco, Texas. From the circumstances it appeared extremely likely that this might represent a mutation rather than a chance admixture, and the case was further investigated.

The seed from the albinistic ear was sown in 1910; one self-pollinated and two reciprocal cross-pollinated ears were obtained. Beside this, pollen from one of the parents used in the reciprocal cross was taken to pollinate three ears of White Dent, and one of another white-seeded variety named Hopi.

The seeds thus obtained were sown in 1911, the plants were selected, and the resulting ears carefully analysed.

It seems probable that the plant which produced the original albinistic ear received pollen from the surrounding yellow plants, and the first generation therefore represented a cross between white and yellow, in which the former was dominant. This is a most unusual occurrence and the dominance appears completely reversed in subsequent generations. In a general way the progeny of the albinistic ear can be said to have resulted in all shades of yellow with a pronounced tendency to fall into two groups representing 25 per cent. of white and 75 per cent. of yellow. This suggests a single Mendelian character; but the segregation is not complete, as many of the grains in the recessive class show traces of yellow. On the other hand the numbers do not fit any better under the assumption that two or more Mendelian factors are involved.

491 - **The Relation of Certain Ear Characteristics to Yield in Corn** (Maize). LOVE, H. H.: in *Proceedings of the American Breeders' Association*, Vol. 7, pp. 1-10, Washington, 1912.

Studies made on two varieties of corn grown for two seasons. The results show that there exists a slight positive correlation between ear length and the breadth of the ear, and the yield of the offspring. That the number of rows of grain on the ear, and the shape of the ear (cylindrical or tapering) do not have a marked effect on the yield.

The Production of New and Improved Varieties of Timothy. — WEBER, J.: in *Cornell University Agricultural Experiment Station, Bulletin* 813, pp. 339-381. Ithaca, N. Y., 1912.

Full report of the timothy breeding experiments carried out at Cornell Experimental Station (1).

The Seed-Farm at Sehlstedt, Germany. — DAMSEAUX A.: in *Annales de l'Institut National de Recherches Agronomiques*, Year 23, No. 8, p. 130. Brussels, March 1, 1913.

An account of the seed-farm belonging to the firm of Strube, including a description of the methods employed for obtaining races of cereals adapted to the conditions of North-Eastern Europe, and for raising the Kleinwanzleben sugar beet.

The Improvement of Indian Wheat (2). — HOWARD, A. and HOWARD, G. I. C. Paper read at the Punjab Agricultural Conference, Lyallpur, November 4, 1912. *Agricultural Journal of India*, Vol. VIII, Part. I, pp. 27-34. Pusa, January 1913. Discussion of the results obtained by the two main lines of improvement:

- 1) Agricultural improvements consisting of hot-weather cultivation and dry-farming methods, combined where necessary with green manuring.
- 2) Improvement in the kinds of wheat grown, by which both yield and quality have been raised.

Svalöf (Golden Barley ("Gullkorn")) — TEDIN, HANS: in *Sveriges Utsädesföretags Tidsskrift*, Year XXIII, Part I, pp. 27-50. Svalöf, 1913.

Svalöf Golden barley, which appeared on the market this spring for the first time, is a new pedigree variety, which has been selected from an old Swedish barley coming originally from the island of Gotland. It belongs to the *mutans* variety and the grain has the so-called "toothed" characters, the rachilla long-haired and the inner pair of nerves of the glumes toothed. These characters are not variety characters, but those of types or groups, but they are of great practical importance, since they in some measure make control easier; for the work of selection they have no direct importance.

The chief object of this Golden barley is to replace Svalöf Hannchen in general farm-practice; it agrees essentially with the Hannchen in its characters of practical importance; thus its stems scarcely reach the height of Hannchen, and are slender, but strong and rigid; and its ears are very thick. The 1000-grain weight, the bushel weight and the rate of ripening are also the same as for Hannchen. But Svalöf is easily distinguished in the field from the fact that its ears are dark reddish before ripening and are completely drooping while those of Hannchen are either suberect or nearly horizontal; when

See No. 1514, B. Nov. 1912.
See No. 357, B. April 1913

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threshed, besides the above-mentioned grain characters Hannchen longing to the α -type with a long-haired rachilla and toothless to the glume, the shape of the grain is better in Svalöf Golden, short and plump, while Hannchen is somewhat elongated.

In the comparative experiments made at Svalöf and at Ultu Central Sweden (Branch of the Seed Selection Association) the ϵ barley has been tested since 1900. In addition, a number of experiments have been made in different provinces of Southern and Central Sweden. In these experiments, as in all others carried out at Experiment Stations and on farms, the average grain yield of Svalöf ϵ has in every case exceeded that of Hannchen. Though the difference is not particularly large, it is too regular to be the result of chance.

The other varieties tested were also more or less inferior in yield to Golden, Princess alone showed itself slightly superior in respect upon one single occasion (at Alnarp in Schonen).

The straw yield of Golden is the same as that of Hannchen, considerably less than, for instance, in Princess and Chevalier.

Golden has the advantage over Hannchen of being less susceptible to smut.

As compared with Hannchen, Golden very soon reaches the stage of "after-ripeness" or "germ-ripeness," so that it can be used for sowing almost immediately after harvest.

496 - **Data concerning Varieties of Rice.** — CONNER, C. M. in *The Philippine Agricultural Review*, Vol. VI, No. 2, pp. 86-92 + 3 diagr. Manila, February 1912.

This is a continuation of the study on varieties of rice of the Philippines (1). Diagrams are given comparing the behaviour of varieties grown in the Philippines with those grown in Indo-China as regards the time required to mature, the yields, the ratio between the dimensions of the grain (expressed by the product of the length by the width in millimetres) and the number of grains per head or raceme. Between the dimensions of the grains and the yield per acre, upland and lowland varieties are kept separate.

In one experiment, 279 lowland white varieties grown in China were compared with a like number of lowland white varieties grown in the Philippines, the tests being made in duplicate at two separate places. It was found that the greatest number of varieties experimented upon mature in six months from sowing. The average yield per acre does not increase with the number of months to maturity. In fact months to maturity bears no relation to yield. The number of varieties with exceedingly small or exceedingly large grains is very limited; also the smallest grains are found in the upland varieties only. Practically all of the upland varieties are non-bearded, a large percentage of the lowland varieties are bearded, and the best grains are found among the non-bearded varieties.

(1) See No. 27, *B. Jan.* 1913.

The greatest number of lowland varieties yield 1400 and 1500 lbs. dry per acre, while the upland varieties vary within wider limits. The upland varieties have as a whole longer and wider leaves, and 90 per cent of them have smooth leaves, while the lowland varieties are 90 per cent. of the upland and 1 per cent of the lowland have smooth, the others have rough blades). Practically all the bearded varieties have rough blades. The upland varieties do not stool so freely as the lowland and as a rule have much larger and thicker culms or

At present in Argentina rice growing is not very important. In 1911 tons of rice were produced in the provinces of Tucuman, Salta, Jujuy, but it would be quite possible to produce besides the quantity required by the country; namely 50,000 tons, a certain quantity for exportation. To attain this object, however, some legislative and administrative measures would be necessary, such as the institution of an export station for rice, and the adoption of protective duties.

The jack bean (*canavalia ensiformis*) is a native of the West Indies and the adjacent mainland. It has been repeatedly tested in the United States as a forage plant, and the following are some of the results obtained, together with the publications containing the information.

Yield per acre		Publication
to 40 bushels	beans	Mississippi Agric. Exp. Station, Bull. 39, 1896.
"	"	Texas Agric. Exp. Station, Bull. 34, 1895.
"	"	W. Carolina Agric. Exp. Station, Bull. 133, 1896.
to 20 tons of	green fodder . .	Hawaii Agric. Exp. Station, Bull. 23, 1911.

In the Hawaii experiments, while the crop proved quite drought-tolerant, it responded well to irrigation.

In Porto Rico the jack bean has been found very useful as a manure and cover crop in citrus groves. Judging from the behaviour of the plant in trials in Florida, it should prove equally valuable. It has recently been introduced into Java, where, on account of a large yield of seed, the agricultural authorities were endeavouring to find a market for the product in Europe.

The value of the plant as forage is yet problematical. In experiments made at the Mississippi Agricultural Experiment Station with these beans to beef and dairy cattle, they were found to be unpalatable and undigestible.

The sword bean (*Canavalia gladiata*) is found cultivated throughout much of southern Asia and also in Africa. At various times it has been introduced into America, but is still cultivated almost entirely as a curiosity or as an arbor vine. As forage it is not as desirable as the jack bean, as the foliage is as bitter and the habit inferior.

As a cover crop the Indian variety with red seeds and red flowers has proved very satisfactory in Porto Rico. Cattle are said to be fond of the plant there to a limited extent.

In the South of the United States the sword bean is not frequently seen, but the green pods are not used as a vegetable. In the impression prevails that the seeds are deleterious. Such an impression is erroneous, as the sword bean is largely used as a vegetable in India, Burma, Ceylon, Java and Mauritius. The pods are best when about half grown. The plant does not mature freely as far north as Washington, D. C., but does produce an abundance of green pods in late September and early October. It seems well worthy of cultivation as a vegetable throughout the Southern States.

499 - Elephant Grass (*Pennisetum purpureum*): a New Fodder Plant. STAFF, O.: in *Royal Botanic Gardens, Kew, Bulletin of Miscellaneous Information* 1912, pp. 309-316. London, 1912.

The Rhodesia Agricultural Journal, Vol. X, No. 3, p. 368 (note). Salisbury, February 1913.

In the June number of the Rhodesia Agricultural Journal a new fodder grass was described as Zinyamunga or Napier's grass and in the autumn of the following year, specimens were sent to the Department of Agriculture for identification and samples were analysed at the Department of Agriculture, Salisbury, Rhodesia.

The grass was identified as *Pennisetum purpureum* Schumacher (*Benthamii* Steud.), a species of very wide range in Tropical Africa. It is known under a variety of names amongst others as "elephant grass"; but, common as it is, very little is known about its life and uses; and even its limits as a species, and its differentiating varieties are not settled. Though mentioned as a fodder plant by other observers from 1905 onwards, it was quite independently of sources that Mr. E. G. Kenny, Native Commissioner, Gutu, and Mr. Napier, of Springs, Bulawayo, first noticed the grass in the Gu

in 1908, and two years later they published a short account of experiments with it in the *Rhodesia Agricultural Journal*. They said that it was a good drought resister, remained green on dry land into the autumn, and withstood frost to a remarkable degree; further that it was relished by stock and evidently of considerable economic value.

In March 1910 a plot was planted in the Botanical Experimental Station, Salisbury, and tested against sugar cane. A first cutting was made in July 1911, and on analysis gave the following results:

	Sugar cane fodder per cent.	Napier's fodder per cent.
Water	73.63	61.81
Ether extract22	.29
Protein (Nitrogen \times 6.25) . .	1.27	2.92
Carbohydrates	17.73	17.29
Woody fibre	5.32	14.77
Ash	1.83	2.92

The Napier fodder contains rather more nitrogen than the cane, the stalks are far less juicy and the juice is of low sugar content; the other hand it yields a rich ash, and this may be the meaning of the Gtutu natives' statement that they plant it to "make the other things grow." It is propagated like sugar cane by subdivision of the stems, by cuttings, or freely by slips and roots. Plants established at Botanical Station in March 1911 were cut to ground level in August in order to provide cuttings for further propagation. The first cutting forage was obtained in the following February, and subsequent cuttings were taken on March 30, May 30, and June 30. With the two former the growth was about 4 ft. in length, but with the two latter about $2\frac{1}{2}$ ft. No rain fell after the end of April, the total for the season being 21 inches. A few weeks after the June cutting, new growth appeared, and the plants remained green, with leaves several inches in length, throughout the whole winter, strong growth commencing again in October. Under similar conditions it is a more rapid grower and provides a greater bulk of succulent feed than sugar cane. Hitherto it has been grown in rows 3 by 2 feet apart and this seems a suitable spacing. Though its main value is undoubtedly as a soiling crop, as a perennial pasture grass it is by no means to be despised, and it can be recommended with confidence for trial on dry land.

- Nonperennial Medicagos: the Agronomic Value and Botanical Relationship of the Species. — MC KEE, R. and RICKER, P. I. in *United States Department of Agriculture, Bureau of Plant Industry, Bulletin*, No. 267, pp. 38. Washington, February 1913.

At present the only non-perennial species of *Medicago* widely distributed in the United States are the spotted and toothed bur clovers (*M. rubra* and *M. hispida denticulata*), and yellow trefoil (*M. lupulina*);

but since 1898 about 60 species and varieties have been introduced for experimental purposes, and an account is given of the progress of work.

- 501 - **Cultivation Experiments with Leguminous Forage Plants in Argentina.** — TONNELIER, ADOLFO C. *La Soja hispida.* — *Boletín del Ministerio de Agricultura y Ganadería de Córdoba*, Vol. XIV, No. 11-13, pp. 1351-1357, Buenos Aires, 1912. — *Ensayos con el O* (*Vigna unguiculata*). — *Ibid.*, pp. 1358-1314 + table.

This paper reports upon cultural experiments conducted at the Experiment Station annexed to the "Escuela Nacional de Agricultura y Ganadería de Córdoba"; it gives data as to the amount of forage and of seeds obtained with several varieties, as to their nutritive and food value. It states the most favourable time for sowing and harvesting. It shows especially the advantage of obtaining a crop of forage by sowing after reaping a cereal and mowing in the autumn of the same year, that is, as a catch crop.

- 502 - **Keeping Soft Cuttings Alive for Long Periods.** — OLIVER, GEORGE W. U. S. Department of Agriculture, Bureau of Plant Industry, Circular No. 111 (Miscellaneous Papers), pp. 29-31. Washington, February 1, 1913.

For the transport of soft or herbaceous cuttings, such as the lucerne and clover, the writer recommends the following method:

Arrange a layer of cuttings without too much crowding, with the upper surfaces of the leaves on a piece of strong glass, and place 2 inches of living sphagnum moss evenly distributed over the cuttings. Place another layer of cuttings on top of this moss with the under surfaces of the leaves next to the moss, and on top of this second layer of cuttings place a second piece of glass. Press down firmly, as with strong twine. If the moss is kept moist and all the possible is given, the cuttings are not in the least injured. If the journey is long enough, say four to six weeks, lucerne and many other plants will root freely.

- 503 - **Fibre from Different Pickings of Egyptian Cotton.** — KEARNEY, THOMAS. U. S. Department of Agriculture, Bureau of Plant Industry, Circular No. 112 (Miscellaneous Papers), pp. 37-39. Washington, January 18, 1913.

Two pickings were made from cotton plants of the Yuma variety at Sacaton, Arizona: the first early in October, the second about a month later. The first picking consisted largely of the bolls borne on the fruiting branches of the main stem. The cotton of the two pickings showed the following differences:

	Picked in	
	October	November
Range of variation of length of fibre . . .	3/16 inch	2/16 inch
Weight of fibre per 100 seeds	4.90 grams	5.17 grams
Weight of 100 seeds	12.9 "	13.4 "

Further, the fibre picked in November averaged one-sixteenth of an inch longer than that from the first picking; it was also generally stronger and finer.

the lighter weight of the seeds picked in October, and their colour, that they were not thoroughly mature, and it is not unlikely that seeds possess a lower percentage of germination.

Similar experiments were made at Bard, California, in 1911 with the variety of cotton. But the first cotton ripened so early that it was picked in bulk about the middle of September, thus eliminating the cotton from the early opening bolls near the bases of the plants. This reason the cotton from the two pickings showed less difference than at Sacaton.

From these experiments it would seem advisable to make the first picking of Egyptian cotton as early as the number of open bolls will permit at the expense of the operation and to keep this fibre as a separate grade and not to mix it with the bulk of the crop which may be expected to show decided superiority in grade and quality. It is also probable that the latest cotton to ripen, especially that contained in the bolls which open after a severe frost, should also be graded separately.

Durango (Cotton in the Imperial Valley, California. — COOK, O. F.: in *S. Department of Agriculture, Bureau of Plant Industry, Circular No. 111 (Miscellaneous Papers)*, pp. 11-22. Washington, February 1, 1913.

In the regions infested by the cotton boll weevil (*Anthonomus grandis*) the cultivation of the long-stapled cotton is seriously hindered by the fact that this cotton is mostly of late-maturing types, and consequently more severely injured by the parasite. The United States Department of Agriculture has therefore for several years past endeavored to produce an early long-staple cotton. Among others thus produced three following may be mentioned: Columbia, which was obtained by a night selection from a short-staple variety; Foster, obtained by crossing long and short staple varieties; and Durango by acclimatization selection of an imported stock from the State of Durango, Mexico, which belongs to the Upland type. Some long-stapled early cottons have been obtained and gave good results when the weather was favorable to them, but Durango showed greater power of adaptation and good yields where other varieties had failed. The Durango plant has an erect bearing; it is early and bears heavily; its bolls are large and they open well; its foliage is light and open. In the Imperial Valley in California, Durango was tested in experimental plantings in comparison with Columbia, Foster, Allen and Egyptian, and proved so superior to all its competitors that the local cotton-growing community is making an organized effort to place the valley exclusively on a Durango basis.

Henequen. — BOURGEOIS, HENRY: in *Annales Diplomatiques et Consulaires*, Vol. IX, No. 12, No. 160, pp. 9-10. Paris, January 1913.

Information respecting the production of Henequen in Mexico and statistical data as to the amount exported, the countries to which it is

sent, and the value of the exports ; together with information re a tax intended to form a " Defence Fund " for the purpose of his the influence exerted on the market by speculators.

506 - **New Zealand Flax (*Phormium tenax*) Refuse. Its Manurial**

ASTON, B. C.: in *New Zealand Department of Agriculture, Industries and Commerce The Journal of Agriculture*, Vol. IV, No. 1, pp. 16-18. Wellington, January

It has often been observed that cattle seem to find the *Phormium tenax* palatable, especially when these are young; therefore been suggested to utilize the refuse of the process of extracting the fibre as food for cattle. Others have proposed that if the sulphite process be used to obtain the fibre, the rejected portion leaves could easily be converted into papermaker's pulp. It has been stated that the ash of the refuse would make a lye to use for the partial cleansing of the fibre.

At the writer's suggestion experiments were carried out at Weraroa (Levin), Ruakura (Hamilton), and Moumahaki Experimental Farms with flax waste used as manure. At Levin, on a plot resting on gravel, a potato plot dressed with 20 tons of flax waste per acre gave a crop somewhat inferior to that given by 2 tons of superphosphate. A 30-ton-dressed plot was very much better than the artificially dressed plots.

At Ruakura the following results were obtained :

	20 tons refuse	10 tons 2 cwt. 2 cwt. 1
Cost of manure *	£2 10s	£2 1
Yield per plot: potatoes	1 ton	19
Yield per acre	10 tons	9 tons
Increase over unmanured, per acre	2 tons 7 1/4 cwt.	1 ton 1
Value of increase with potatoes at £4 per ton . .	£9 9s	£7
Profit per acre due to manure	£6 19s	£5

* Allowing 2s 6d per ton for cartage.

At the Moumahaki Farm an experiment was made on a mangels, with the following results :

	2 ½ cwt. Superphosphate 28 cwt. Flax waste	56 cwt. Flax waste
acre.	£1 6s 6d	£1 8s
1 acre (roots).	79 tons 4 ½ cwt.	15 tons 8 ¾ cwt.
1 acre (tops).	9 tons 7 ¼ cwt.	4 tons 10 cwt.
over unmanured, per acre.	70 tons 11 ½ cwt.	7 tons 6 cwt.
ton of increase	4 ½ d	3s 10d

Comparing flax-refuse with stable manure it may be said that containing similar amounts of water and phosphoric acid, the contains larger amounts of potash and nitrogen.

The refuse in question has given excellent results in fields near the sea, on pastures (as top dressings) and on pumpkins. This manure of special value for the country, as stock raising in stables is limited consequently stable manure is rare.

The Cultivation of Kapok.—DE WILDEMAN, R.: in *Bulletin de l'Association Planteurs de Caoutchouc*, Vol. V, No. 3, pp. 58-60. Antwerp, March 1913.

The writer records the appearance of a certain number of publications treating of this subject; he calls attention to the fact that the cultivation of *Eriodendron* depends largely on the climate and little on the soil. After giving, from data collected in Java by Mr. G. F. J. Bley, the cultivation expenses of a plantation of 300 bouws (525 acres), M. de Wilde states that the Dutch consider Kapok cultivation to be only profitable when practised by the natives.

Textile Plants.—*La Quinzaine Coloniale*, Year 17, No. 4, pp. 136-138. Paris, February 25, 1913.

A summary of the different data collected respecting the several species of *Hibiscus*. The writer avails himself of a memoir by A. de Wilde and G. L. C. Howard: Some New Varieties of *Hibiscus cannabifolius* L. and *Hibiscus Sabdariffa* L. (*Memoirs of the Department of Agriculture in India, Bot. Series*, Vol. IV, No. 2). He mentions a study of *Sabdariffa* by P. J. Webster: Roselle, its Cultivation and Uses (*The Philippine Agricultural Review*, Vol V, No. 3, p. 123; Manila, 1912), and mentions, as other sources of information respecting Gombo fibre, viz. Banansek: Gambobanf (*Real enzyklopädie d. ges. Pharm.*, II edit., 5, 511); v. Hohnel: *Microskopie der technisch verwendeten Faserstoffe*, II edit. 1905, 56; Matthews: *Textile Fibres* (New York, II edit., 1907, 1908); Weisner: *Die Rohstoffe des Pflanzenreiches* (Leipzig, II edit., 1903,

In this recapitulation are given the native names given in *H. cannabinus* and *H. Sabdariffa*. Those of the former are: *ambadi, pulu, mesta pat, dare Budrun, patsom, sherha, gogu sigjado* and *sankuhra*; those of the latter are: *mesta patwa, bal, and*

The Gombo hemp, known also under the names of Roselle, hemp and Bimlipatan jute, has lately entered the European by way of England. Amongst the varieties of *Hibiscus* must mentioned: *H. squamosus, H. esculentus* and *H. lunariifolius*; from Northern Nigeria, produces the fibre called «ramma».

509 - The Composition of Beets in the Dry Year 1911 and the Effect Rains upon Them. — URBAN, J.: in *Zeitschrift für Zuckerindustrie* in Year XXVII, Part 6, pp. 303-308. Prague, March 1913.

On account of the drought and the heat, the year 1911 was unfavourable to beets in Bohemia, especially so to those sown usual time in spring, which suffered from want of moisture during autumn and thence on to September. It was only due to the autumn that the crop was enabled to attain from 40 to 60 per cent. of a crop.

The writer, availing himself of the weather forecasts of the meteorological stations issued at the beginning of September, which announced the approach of rain, set himself to study the changes that the rain would bring about in the beets. On September 13 he lifted 200 beet plants from the production of beet seeds at Větrušice near Prague. The plants began to fall on September 14, and by October 4, 81.7 millimetres had fallen. On this day 150 beets were lifted and analysed as they had been.

The following table gives the results:

	Before the rain (September 13)	After (Oct 4)
Average weight of fresh root grams	132.0	111
Dry matter in root per cent	22.7	21
Sugar content. "	16.82	15
Weight of dry matter per root grams	30.0	23
" of sugar "	22.2	18
" of fresh leaves per plant "	103.0	111
Dry matter in leaves. per cent	16.7	15

Composition of the dry matter.

	Root		Leaves	
	Before the rain	After the rain	Before the rain	After the rain
	grams	grams	grams	grams
H ₂ O	30.00	34.10	17.20	21.30
Nitrogen	0.44	0.42	0.56	0.70
P	0.23	0.24	0.38	0.54
K ₂ O	0.29	0.18	0.47	0.44
CaO	0.26	0.29	1.82	1.34
MgO	0.08	0.14	0.32	0.42
SiO ₂	0.11	0.12	0.10	0.16
SO ₃	0.09	0.08	0.07	0.10
Phosphoric acid	0.07	0.08	0.26	0.22

above analyses show :

i) That the beets gathered before the rain, in spite of their leaves yellow and wilted, were not mature. A confirmation of this view is in the high total content of nitrogen (0.335 per cent. of the weight of the fresh root, whilst mature beets contain only 0.14 to 0.2 per cent. of nitrogen in the soil, on average 0.17 per cent.) and especially of proteid nitrogen, in the great quantity of alkali in the root with a relatively low content of lime. In such conditions the extraction of sugar in the laboratory would have been very difficult.

ii) "Even when abundant rain falls later, a wilted beetroot plant does not immediately absorb nutritive substances from the soil, owing to the want of root hairs ; it first forms new hairs and rapidly builds up necessary organs of assimilation at the expense of the nutritive substances, especially the potash in the beetroot."

iii) "The capacity of the new leaves for forming sugar was limited during the month of September, owing to the prevailing climatic conditions, for only 0.62 grams of sugar were formed daily by 100 grams of dry matter of the leaves, while in normal summers the daily formation of 1.82 grams of sugar during the month of September has been stated."

iv) "In beet plants grown during persistently dry weather considerable quantities of non-proteid nitrogen are stored, a great part of which during the succeeding rainy period, is transformed into proteid nitrogen. Consequently upon such formation of proteid nitrogen at the

expense of the remaining nitrogen (difference between the total a proteid nitrogen) and upon the migration of the nutritive sub into the root hairs and eventually into the new leaves, the juice root acquires a composition which renders it more favourable to ment in the sugar factories.

510 - Experiments made in the Experiment Fields of the Djokja Sub- of the Experiment Station of the Java Sugar Industry in 1911.

DEVENTER, W., HOUTMAN, P. SCHAFF, J. and ECKER, E. E. in *Archief voor de Industrie in Nederlandsch Indië*, Year XXI, Part 6, pp. 121-172 + 1 pl. ruary, 1913.

A report of the experiments made in 1911 on the sugar cane Djokja Sub-Section of the above-mentioned Station.

The following were the subjects of the experiments: a) ma with various quantities of sulphate of ammonia; b) potash ma c) manuring at different seasons; d) phosphatic manures; e) as manure; f) molasses as manure; g) scum from sugar factories as ma h) comparison of canes of different origins; i) different intervals of ing; j) various varieties of canes; k) various. The method of ment is described and analyses of the soil are given.

511 - Manuring Experiments with Sugar Beets in Hungary. - PÓLYA, in *Köztud.*, Year 23, No. 17, p. 573. Budapest, March 1st, 1913.

A long series of experiments made every year at Tavarnok ((of Nyitra) on the estate of Baron Stummer.

A. Experiments on three experimental fields of 14.22 ac moderately heavy clay soil. The previous crop had received manure over the whole extent of these three fields and the soil was in the same manner. The following table gives the results and the experiment.

Fertilizers per acre	Yield per acre	Excess over control	Gross return per acre	Cost of fertilizers	Net return
	lbs.	lbs.	£. s. d.	£. s. d.	£. s. d.
I. Control	18 603	—	10-10-10	—	10-10-10
II. Superphosphate. 232 lbs.	23 564	4 961	13- 7- 0	7- 5	12-19- 7
III. { Superphosphate. 232 "	26 045	7 442	14-15- 3	11- 5	14- 3-10
{ Nitrate of soda . 43 "					

N. B. The value of sugar beets is estimated at 18 6.8d per cwt. and the cost of the super and of the nitrate of soda at 4s 5d and 14s 4½ per cwt. respectively.

ese experiments show that the sugar beet is extremely responsive to the effect of chemical manures, especially to that of superphosphate and nitrate of soda.

3. Experiments with fertilizers in drills on three fields each of 2 acres.

Fertilizers per acre	Yield per acre	Excess over control	Gross return per acre	Cost of fertilizers	Net return	Excess return over control
	lbs.	lbs.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Control	18 735	—	10-12-3	—	10-12-3	—
Superphosphate 232 lbs., drilled	22 125	3 390	12-10-8	7-5	12-3-3	1-11-0
Superphosphate 116 lbs., in drills	22 393	3 658	12-13-9	3-8½	12-10-½	1-17-9½

ese figures show that fertilizers drilled in give a larger return than they are spread.

On the other hand, the crops of barley raised on the same fields, the sugar beets, showed that the effect of fertilizers in the drill only lasts one year, while if the fertilizer is spread, its efficacy is maintained to the second year.

Fields	Yield per acre	Price per 100 lbs.	Value
		£. s. d.	£. s. d.
I	1 923 lbs.	6-10	6-11-4 ¾
II	2 155 "	—	7-7-3
III	1 937 "	—	6-12-5

The writer advises a combination of the two methods of applying fertilizers, in the following manner: the spreading, for instance, of two-thirds of the 232 lbs. of superphosphate and the drilling in of the rest of the seed. In this way, the sugar beets would receive enough fertilizer substances and would leave a sufficient amount for the succeeding crop.

C. Experiments were made by growing autumn wheat on three experimental fields each of 21.31 acres (the soil being a moderately stiff loam) to ascertain whether bone meal could rival superphosphate as a fertilizer under the conditions prevailing in Hungary.

The results per acre were as follows:

Fields	Yield
I Control	2012 lbs.
II Superphosphate 232 lbs.	2310 "
III Bone meal 209 lbs.	2177 "

Taking these results as a basis, the writer considers that, under given conditions, superphosphate is more to be recommended than bone meal.

512 - **Preliminary Report on Sugar Production from Maize.** - CLARK, in U. S. Department of Agriculture, Bureau of Plant Industry. Circular No. 111 (Miscellaneous Papers), pp. 3-9. Washington, February 1, 1913.

The experiments were conducted at Garden City, Kansas, and Washington, D. C. The variety used at Garden City was St. Evergreen sweet corn. It was planted on May 15 and the ear removed on August 9 when in the milk stage. For the Washington experiments a dent corn, a selection of the Boone County White, was used. It was planted about May 30 and the ears were removed on August 22. Tables are given showing the results of the analysis of the corn stalks (from some of which the ears had been removed and on the others they had been left) gathered on different dates. Experiments were also made on extra pressing the stalks and on the fermentation and evaporation of the juices.

In conclusion, the experiments show that the removal of mature ears from maize stalks greatly increases the sucrose content of the juice. There is also a small increase in non-sugar solids and a pronounced increase in purity. The percentage of invert sugar is materially affected.

Comparison of corn with sorghum and sugar cane as a source of sugar

Plant source	Solids	Sucrose	Invert sugar	Non-sugar solids
	Per cent.	Per cent	Per cent.	Per cent.
Maize:				
Grown at Garden City:				
Ears removed	16.37	10.44	—	—
Ears not removed	11.53	5.65	—	—
Grown at Washington, D. C.:				
Ears removed	14.21	8.71	2.09	3.31
Ears not removed	8.13	3.31	2.13	2.69
Sorghum (average of 29 analyses, 4 varieties) . . .	14.11	9.11	0.82	4.18
Sugar cane:				
Louisiana (3 varieties) . .	15.30	12.15	1.35	1.78
Hawaii (17 varieties) . . .	17.86	15.59	0.43	1.84

the purity coefficients of the juices are relatively low, the highest being 74 per cent. As a sugar-producing plant maize compares very favourably with sorghum in the chemical composition of its juice, but much lower than sugar cane in sucrose and purity as will be seen from the table given on the opposite page.

These preliminary studies have been carried out with only two varieties of maize. Other varieties might give more, or less, favourable results. Besides, maize responds to selection for specific purposes, and it is possible that results achieved in the selection of beet might be obtained with the proper selection of maize.

Short Review of the Sugar Industry in the Philippine Islands. — HARRIS, C. M.: in *The Philippine Agricultural Review*, Vol. VI, No. 2, pp. 74-80 + 100, Manila, February 1913.

The cultivation of sugar cane and the art of making sugar were first established in the Philippines when these islands were discovered. In the provinces of Pampanga and Batangas, where sugar making was first carried on, it spread to the other islands.

Sugar cane is grown on every kind of soil, from the light sandy soil of Pampanga to the black, heavy, very fertile clay of Laguna and Batangas, or the volcanic and fertile soils in the neighbourhood of the Taal volcano and the Occidental Negros. In the Occidental Negros the average yield of sugar is 2046 lbs. per acre. The average yield, though, is lowered by the number of fields poorly managed and the number of fields of low fertility planted to cane. On well managed plantations the yield per acre will rarely fall below 24 piculs (3389 lbs.), and it often comes nearer 28 piculs (3925 lbs.). Commercial fertilizers are not used to any extent on sugar cane. Mostly some kind of rotation is observed: in Pampanga and Tarlac rice and corn are planted after the sugar crop. In Negros it is the custom to allow the fields to be idle for a year and to pasture the stock on them.

The number of varieties of sugar cane found in the Philippines, prior to the organization of the Bureau of Agriculture, was very limited. The cane ordinarily grown in Negros is, in respect to the richness and purity of its juice, an excellent cane, and having in addition a comparatively low fibre content it lends itself very well to milling. Many varieties have been tested during the last twenty years, but only a few have given satisfaction. Some new varieties introduced from Hawaii have been grown by the Bureau of Science; the following results were obtained at Alabang, province of Rizal:

Analysis of varieties of sugar cane.

Names of varieties	Juice	Polariza- tion	Brix	Coefficient of purity	Names of varieties	Juice	Polariza- tion
	%	%				%	%
H 16	75.8	14.3	16.3	87.8	H 227	78.3	14.1
H 20	90.3	18.3	19.3	94.9	H 309	93.2	14.9
H 27	77.3	17.0	17.9	95.0	Native cane . . .	78.8	19.9
H 69	81.8	12.9	15.0	86.0	Negros Cane. . .	89.9	18.4

The Hawaiian varieties ripened in Alabang much earlier than home. The larger-growing varieties have not met with popular success among the small planters in the Philippines, first because the stalks are too big for the small mills to handle, and then because the larger varieties would not respond properly to the native methods of cultivation. Native cane is planted in rows varying from 20 to 40 inches apart, thus planted check the growth of weeds and grasses, but do not produce the greatest amount of sugar per acre. Some of the more progressive farmers are planting the native cane in rows 50 and 70 inches apart.

Until recently the extraction of the sugar was carried out with primitive methods and plant. Lately one large central mill has been erected at Mangarin, Mindoro. It is capable of grinding 1200 tons in twenty-four hours. Two mills of like character are being built, one at Calamba, Laguna, and the other at San Carlos, Occidental Negros.

514 - Varieties of Sugar Cane tried at the Experiment Station of the "Instituto de Arboricultura y Sacarotecnía" at Tucumán, Argentina. - See MINGO L.: in *Boletín del Ministerio de Agricultura*, Vol. XIV, No. 11-12, 1637. Buenos Aires, 1912.

In the five years between 1908 and 1912, 82 varieties of sugar cane were tested at the above station. The varieties Roxa 15, Tambois Rouge 26, Cayana 48, Verde de las Antillas 50, Sin nombre 58, Sin nombre 65, Riscada de Santa Barbara 74, Java 234 were distinguished for their sugar content; Cayana 48, Verde de las Antillas 50, Sin nombre 52 and 58, and 76 Java for their resistance to *Bacillus sacchari* (polvillo), though no completely resistant variety exists; the same varieties with the exception of Sin nombre 52, for their relative resistance to the attacks of *Diathraa saccharalis* (perforador); the varieties Roxa 15, Tamarin 21, Bois rouge 26, Sin nombre 52 and 58, Riscada de Santa Barbara 74, and 76 Java for their resistance to sudden falls of temperature, which in Tucumán constitute the chief risk in sugar cane growing.

in the whole, 76 Java 234 is, of all the varieties tested, the one to be recommended. In three analyses of this cane the percentage of saccharose ranged between 11.75 and 15, the purity between 89.82, and the industrial value from 9.79 to 13.47.

The Extraction and Use of Kukui Oil. WILCOX, E. V. and THOMPSON, ALICE R.: *Hawaii Agricultural Experiment Station, Honolulu, Press Bulletin No. 39, pp. 8, Feb. 17 8, 1913.*

Kukui (*Aleurites triloba* or *A. moluccana*), is generally distributed about Polynesia, Malaysia, Philippines, Society Islands, India, Java, Malia, Ceylon, Bengal, Assam, China, Tahiti and Hawaii. It has been introduced into the West Indies, Brazil, Florida and elsewhere. In Hawaii it is common on all the islands, being the dominant native tree of the lower mountain zone. The oil expressed from the kernel of the tree is a drying oil and dries more quickly than any other known oil. It is suitable for use in the manufacture of soft-soap, oil-varnishes, paints, varnishes, etc., for burning, and as a wood-preserved; it is used externally as a plaster and as an article of diet.

At one time the exportation of kukui oil from Hawaii amounted to about 8 000 to 10 000 gals. per year; the greatest production occurred about 1840 to 1850; at that date the oil was valued at 50 cents per gallon.

The total area of kukui in Hawaii is estimated at from 10 000 to 15 000 acres; 15 000 acres may probably be assumed as a safe estimate. At a rate of 80 trees per acre and 200 lbs. of nuts per tree, there would be a yield of 8 tons of nuts per acre. A conservative estimate would be 5 tons of nuts. If we assume that not more than 10 000 acres of area of kukui are readily accessible, the yield would be 50 000 tons which would produce 2 375 000 gallons of oil.

According to laboratory experiments of the writer it would require about 10 tons of nuts to produce 10 000 gals. of oil weighing 7.36 lbs. per gallon.

The kukui is practically free from serious insect pests or fungous diseases, and bears an annual crop of nuts without fail. From the writer's experiments it appears easy for a man, woman or child to pick 100 lbs. of nuts per day. At 30 cents per 100 lbs., the labourer would receive \$1.50 for a day's work. The kernel equals 30 per cent. of the weight of the nut; the average oil content is 65 per cent. of the kernel, or 19.5 per cent. of the nut. In the Sunda Isles, where kukui oil is an important article of export, experiments have shown that 90 per cent. of the oil, equalling 17.5 per cent. of the weight of the nuts, is obtained by special methods through the use of presses. From 100 lbs. of nuts 17.5 lbs. of oil would be obtained, or a value of \$1.75 at 10 cents per lb. An extremely small percentage of the nuts spoil or turn rancid after lying two years on the ground. The spoiled nuts float in water and may thus be easily separated from the sound ones.

Kukui oil may be obtained by grinding the kernels and applying pressure with or without previous roasting of the nuts.

Chemistry of kukui oil.

Specific gravity	0.92 at 15.5° C.
Saponification value	179.1
Iodine number	155.5
Hehner value	89.9
Soluble acids	1.71
Reichert-Meißl number	2.82

Constituents of the kukui kernel.

	Fresh nuts
Moisture	7.14 %
Fat	66.25 "
Ash	3.05 "
Protein	19.88 "
Fibre	1.39 "
Nitrogen-free extract (by difference)	2.29 "

The press-cake is unusually rich in nitrogen (46 to 48 per cent. of protein), phosphoric acid (about 4 per cent. P_2O_5) and potash (about 2 per cent. K_2O). It therefore has a high value as a fertilizer, but it cannot be used as fodder as it has a poisonous effect upon stock.

516 - *Canarium polyphyllum*: a New Oil Fruit from German New Guinea

KRAUSE, M.: in *Der Tropenpflanzer*, Year 17, No. 3, pp. 147-150. Berlin, Mar.

Canarium polyphyllum (Burseraceae) is frequent all over German New Guinea. In the islands of the Malay archipelago there are several species of *Canarium* from which is obtained the oil known in the islands as « Kanariaöl », « Javamandelöl », « Huile de Canaria », « Java almora » and « Jungle badam » (Hindustan).

In size and shape the fruit of *C. polyphyllum* resembles a walnut.

The writer extracted, by means of ether, the fat from fruit obtained from German New Guinea, and obtained the following results:

Canarium polyphyllum

Weight of 10 nuts with their woody shell	93 grs
Weight of 10 kernels	21 "
Fat in kernels, per cent.	68.23
Nitrogen in residue after extraction with ether, per cent.	9.77
Equivalent to protein	61.06
Values of the fat:	
Solidifying point	19 to 24° C.
Melting point	30° C.
Refractive index at 20° C.	1.475
Acid value	226
Saponification value (Koehtstorf)	200.2
Iodine value	59.74
Reichert-Meißl value	4.41

eding experiments have shown that neither the kernels nor the
ake of *C. polyphyllum* contain injurious substances; and the fruit
n by the natives of New Guinea. The press-cake is rich in
s and is thus a concentrated food. The fat has no unpleasant
r and can be used for the preparation of margarine and the like.

Cuttings or Stumps for planting Hevea (1). — WEBER, A. J. C. Plançons contre
mpe. — *Bulletin de l'Association des Planteurs de Caoutchouc*, Vol. V, No. 3,
49-50, Antwerp, March 1913.

he writer discusses the advantages and disadvantages of the two
ds of making Hevea plantations: by cuttings or by stumps. The
the more costly, but M. Weber thinks it has so many advantages,
e prefers it to the stump method. He recommends the germina-
s is being planted in a nursery about 2 ft. by 2 ft. apart.

Iquitos, and the Tributary Region. The Rubber District of the Amazon. —
To-Day, Vol. IV, No. 10, pp. 537-546. Lima, January 1913.

he article under review is an abstract of a report of Mr. Stuart J.
American Consul at Iquitos, who has made a joint investigation
Putumayo region with Mr. G. B. Mitchell, the British Consul, and
arios Rey de Castro, the Peruvian Consul at Manaos, Brazil.

quitos is the capital and principal town of the Department of Loreto,
includes most of Trans-Andean Peru and has an estimated total
of 288 500 square miles. The climate is warm and moist, the aver-
temperature being from 80 to 88° F. Rains are frequent and abund-
gregating 60 to 75 in. in a year. A vast region of tropical forests,
sed by the Caqueta (Yapura), Putumayo (Ica), Napo, Marañon,
Pastaza, Morona, Santiago, Javary, Ucayali, and Kuallaga river
s, all affluents of the Upper Amazon, is commercially tributary
quitos. As may be seen from the following table, almost the only
d of the district is rubber; all supplies are imported.

Exports from Iquitos in 1911.

Rubber: Fine	1 481 037 lbs.
Entrefine	205 947 "
Scrappy	595 936 "
Slab	85 462 "
Peruvian ball	1 472 892 "
Weak fine and tails	748 590 "
Hides	43 623 "
Vegetable Ivory («tagua»)	991 165 "
Panama hats	117 dozen
Raw cotton ¹	286 lbs.

The export of rubber for the first six months of 1912 reached a total
75 353 lbs., and that of vegetable ivory for the same period 1 430 466 lbs.

¹ See No. 1630, B. Dec. 1912.

(Ed.).

There are a large number of *Phytolophas macrocarpa* palms grow wild in the forests of the territory tributary to Iquitos. The trade nuts of this palm (vegetable ivory, also known as «tagua», «mari gétal» and «corozo nut») is developing. Trade in cinchona, sassa and other drugs has entirely ceased. Valuable woods are to be found in the forests, but there is no trade in them owing to failure in transportation facilities. Experiments are being tried on a small scale: cultivation of cotton, coffee and cacao, but these are as yet of no commercial importance.

The rubber produced in the district of Iquitos is classified as «and» and «caucho». «Jebe» is divided into lowland — fine (smoked), fine (smoked), scrappy (not smoked), and highland — weak fine (smoked) and weak scrappy (not smoked). «Jebe» is obtained from *Hevea iliensis*, trees which grow close enough together to enable the worker to handle a group of one hundred trees, called an «estrada» (walk) in visiting and tapping them. One man can manage two «estradas» on alternate days. The quality of the jebe varies according to soil and method of preparation. If grown on land high enough not to be flooded it is weak, though it may be fine — i. e., it has a fine texture but is at a lower strain than that grown on periodically submerged land, is known as fine without the qualification of weak. Entre-fine is low rubber, but not so well prepared as the fine. Sernamby or scrappy from milk which has coagulated without being smoked, and is brittle.

«Caucho» comes from *Ficus elastica*, which grows scattered solitary in the forest, usually on the higher land and at some distance from the rivers. The tree is not tapped but is cut down, and the sap is allowed to form a pool in a hollow in the ground or in a bowl or basin. The caucho is left on the rivers to the northward of Iquitos. Ball, or namby de caucho, is caucho that has been coagulated without treatment, and then cut into strips and the strips wound into a ball. Slab is caucho coagulated without smoking by a special process which involves mixing it with a kind of green liana, soap or other diluent.

From the Javary River district comes fine, weak fine, weak scrub and ball rubber. The caucho is fairly well worked out there; the same applies in the Napo and Tigre, which were once great sources of rubber, though a good deal of caucho is still available in the Ecuadorian part of the Napo. The rubber from the Putumayo district is called mayo «tails». It is prepared in a different way from that on the other rivers. Not much rubber comes in directly from the Marañón, but if found there includes all the grades of caucho and the weak variety of jebe.

The export duty on rubber is fixed at 8 per cent. *ad valorem* based on the selling price at Liverpool.

It is generally felt that the quality of Peruvian rubber is such that it can hold its own against the production of other regions,

cultivated rubber. The methods of extraction are fairly good, but room for improvement in the elimination of impurities. The Amazon rubber must be washed before it is used in the process of manufacture, Peruvian fine losing 12 to 20 per cent. and 25 to 50 per cent. on account of their moisture content.

Tobacco in Great Britain and Ireland. — ELLIS, R. British-grown Tobacco. *Journal of the Board of Agriculture*, Vol. XIX, No. 11, pp. 904-908. London, May 1913.

Tobacco growing in Ireland may be said to have passed its experimental stage; the commercial possibilities of the crop are proved, and Irish tobacco is subject to the same excise duties as imported tobacco, the present growers are in receipt of a subsidy for a determined period. The official returns show that 61 881 lbs. were produced in 1911, and the price obtained on the market was from 4d to 7d per lb. In England, Scotland, and Wales, home-grown tobacco is subject to the same excise duty, but the Finance Act of 1910 provided for a reduction of one-third of the duty of 3s 6d, i. e. 1s 2d, per lb. upon 100 acres in England and Wales, and 50 acres in Scotland to be grown during the years 1911-12-13. In 1911 approximately 1000 lbs. of tobacco were produced and cured in Scotland, and 300 or 400 lbs. in different parts of England. During 1912 about 40 acres were under tobacco in Great Britain; an average yield of cured tobacco at 1100 lbs. per acre, the estimated weight of the crop may be taken at 44 000 lbs.

This being the first English crop of any commercial importance, considerable interest is being evinced as to results; so far the crop appears to have come through well, and the quality shown in the final stages of grading and rehandling preparatory to packing, seems to be in satisfactory order. The tobacco is still in the growers' hands, and but little has been sold excepting the Welsh crop, which has been sold at a satisfactory figure.

The Data obtained in 1911 respecting the Use of the Products of Crosses of Heavy-Leaved Species of Tobacco Resistant to *Thielavia basicola*. — BELLI-DONNARUMMA. *Ministero delle Finanze, Direzione Generale delle Privatissime, Istituto Icnico della Coltivazione dei tabacchi pubblicato per cura del R. Istituto Sperimentale in Scafati (Salerno)*, Year XI, No. 6, p. 286 + 1 table. Scafati, 1912. This is a general review of the industrial results obtained by cultivating coarse-leaved hybrid tobaccos resistant to *Thielavia basicola*. Some of these crosses unite agricultural and industrial advantages, and make them preferable to the Kentucky variety. The "Agenzia dei tabacchi" is going to institute the cultivation, on a large industrial scale, of Italy X Kentucky and Salento X Kentucky.

321 - **Production and Consumption of Cocoa.** — PERROT, R.: in *Voordrachten en Ioniale Onderwerpen gehouden ter Gelegenheid van de Koloniale Landbouventoon* te Deventer, pp. 167-182. Deventer, January 1913.

The writer gives a complete account of the cocoa industry, including its history, a description of the different species and varieties of cocoa plants, details of cultivation and of the various processes of fermentation, washing, and drying which the kernels undergo before being ready for the market; and then he passes on to consider production and consumption of cocoa in the world.

Up to 1870, the producing area was restricted to Central America, Brazil, Mexico, and the Antilles; but cultivation trials were begun in the Island of San Thomé, which after 40 years was to become one of the great centres of production. More remarkable still has been the growth of the industry in the Gold Coast, for here as late as 1880 production was nil. At the present time the exports are as follows:

America :

	Tons.
Brazil	33 180
Ecuador	30 150
Trinidad	22 881
Venezuela	16 613
San Domingo	14 578
Grenada	6 256
Others	11 362
	<hr/>
	135 022

Africa :

Gold Coast	22 104
San Thomé	29 137
Fernando Po	2 626
German Colonies	3 345
Belgian Congo	689
	<hr/>
	57 901

Asia :

Ceylon	3 472
Dutch Indies	2 420
	<hr/>
	5 892

Africa is rapidly taking the place of America as the chief producing area of the world, and it is interesting to examine the average yields obtained in the two regions. In Africa $3\frac{1}{2}$ to $4\frac{1}{2}$ lbs. is obtained from a single tree, and very frequently the figures are even higher, whereas in America, for no apparent reason, the average yield is only $2\frac{1}{2}$ lbs. The larger African crops are obtained both when cocoa is cultivated on large estates, as in San Thomé, Fernando Po, and Kamerun, and also when it is in the hands of the small native cultivators in the Gold Coast.

Whilst the African production has been increasing with astonishing rapidity, the total consumption has advanced in a no less remarkable manner; figures for 1894 and 1910 are given below.

	1894	1910
United States	7 806	49 490
Germany	8 184	43 224
England	9 789	23 687
France	14 629	24 661
Holland	9 499	15 926
Switzerland	2 081	8 853
Italy	639	1 859
Spain	6 616	5 430
	59 243	173 130

In 16 years the consumption has trebled itself, but it is evident that increase cannot go beyond certain limits; as the culture is spreading in the West Coast of Africa, these limits will probably be reached in the course of a few years, after which time only those regions which are naturally best situated to the cultivation of the plant will continue to give profitable returns.

Horticulture in 1913.—PASSY, PIERRE: *La Vie Agricole et Rurale*, Year 2, No. 13, pp. 349-353. Paris, March 1, 1913.

The writer passes the following subjects quickly in review: climatic conditions; horticultural shows; economic questions; exportation to foreign countries; the importance of bulb growing in Holland; the effect upon the roads of tarring the roads; plant diseases («plomb» and chlorosis); chemical fertilizers (sulphur and manganese); horticultural methods (the pruning system); asexual hybridization and xenia; horticultural varieties (roses, other flowers, vegetables); the instruction of girls in horticulture (a school established at the École Nationale at Grignon).

Winter Pruning of Stocks Preparatory to Grafting on the Spot.—VIDAL, J. L.: *Revue de Viticulture*, Year 20, Vol. XXXIX, No. 1006, pp. 429-433, Paris, March 27, 1913.

In the approach of spring, part of the reserve products which were accumulated in the autumn in the roots of the vine ascend and migrate into the shoots; thus it is easy to understand that those vines from which the shoots have been removed in December will be better supplied with carbohydrates in the spring than the unpruned plants. As far as the quantity is concerned, the larger the supply of reserve-material the more vigorous the grafts which take and the better do these do. The comparative analyses of three young 1202 vines made in May 1911 gave the following results:

	Weight % of fresh material	Carbohydrates per 100 parts dry material	Carbohydrates per 100 parts fresh material	Date cut
Plant not cut back	34.5	23.61	8.14	May 21
Plant cut back in April 1911	38.7	26.90	10.32	May 21
Plant cut back early in Jan- uary 1911	41.2	28.00	11.53	May 11

Thus the uncut vine is much the poorest in reserve substance the time of grafting, while that cut back in January is the richest of the three. The logical deduction therefore is that it is advantageous to reduce to the minimum, from December, the shoots of stocks destined for grafting on the spot in the following spring. Practical experience has confirmed the theoretical conclusions, and the writer deduces from his experiments in the open that the following advantages result from the winter pruning of stocks to be grafted on the spot:

- 1) The increased vigour of the grafts which have taken, very noticeable when the buds are breaking, but always perceptible throughout the vegetative period.
- 2) More complete binding, due to the greatly increased activity of the tissues of the stock, subsequent to grafting.
- 3) Higher proportion of successful grafts.
- 4) Much lower proportion of mortality among the stocks in the case of unsuccessful grafts. More vigorous sprouting of the stocks, and more certain and satisfactory re-grafting of failures in the following season.

The grafting technique is very simple; it is only necessary to stop the shoots by cutting them at the lowest eye. The essential point is that the pruning should be effected as far as possible between the 1st of December and the 15th of January. The most careful vine-grower will derive the most profit from this preparation of the stocks, and as a rule their vines are the most luxuriant and the good effects of the pruning are in direct proportion to the strength of the stocks.

524 - Variation of Yield of Grafted Vines with Age. - RAVAZ, L.: in *La Revue agricole et viticole*, Year 30, No. 9, pp. 257-262. Montpellier, March 2, 1913.

M. Ravaz, in commenting upon the two tables giving the results of 28 consecutive years of vines now 33 years of age (experiment made at Mas le Las Sorres, near Montpellier), writes as follows:

"The deterioration of the grafted vine, when it occurs, is not due to grafting, nor is it generally to be attributed to age. It is due either to phylloxera, in the case of all non-resistant varieties, or to unsatisfactory conditions of the soil or subsoil; in deep, good soil the life of the vine is, so to say, indefinitely long; but in poor or calcareous soil, or where the subsoil is too clayey, or too wet and impermeable, the vines soon begin to fail, after having done well for a shorter or longer time, no doubt as long as most of the roots are in the good superficial soil."

Vineyard Reconstitution and New Stocks. — GÉRAIS, P.: in *La Vie Agricole Rurale*, Year 2, No. 14, pp. 386-391. Paris, March 8, 1913.

In his report presented to the "Société des Viticulteurs de France" (meeting of February 1913), the writer specifies the principles of a reconstitution which are now considered as established and as the essential basis of modern vine growing.

He then proceeds to lay great stress upon the importance, in the light of science, of preserving such of the old stocks as merit retention, entirely fulfilled their early promise, and those new-comers which appear to deserve, a place among the older ones.

On the "Localization" of Direct Bearers. — ROY-CHEVRIER, J.: in *Revue Viticole*, Year 20, Vol. XXXIX, No. 1001, pp. 269-271. Paris, February 20, 1913.

According to the writer, the success of direct producers chiefly depends upon their "localization", i. e. the judicious and wise selection of which are themselves suited in all essential respects to the special climatic and cultural conditions of a given district.

Imbedding Whip-Grafts of Vines in a Hot Chamber. — CHAPPAZ, G.: in *Progrès Agricole et Viticole*, Year 34, No. 12, pp. 356-360. Montpellier, March 23, 1913.

The writer gives a detailed description of the method of imbedding grafts in a hot chamber, which practice obtains more and more in vine-farms where a sufficiently warm spring cannot be relied upon.

According to this system, the grafts are put into open cases with a material as loose as possible and which can retain a certain amount of moisture; these cases are placed in a room with a temperature of 30° or 35° C. (86 to 95° F.) for the time required for them to bind properly. The substance generally used in the cases is a mixture of poplar sawdust and charcoal dust; the former retains the moisture and the latter allows the excess of water to drain off, while it prevents fermentation and the growth of moulds.

Reconstitution of the Vineyards in the South of France. — MARÈS, E.: in *Le Progrès Agricole et Viticole*, Year 30, No. 10, pp. 295-299. Montpellier, March 9, 1913.

Being the present high price of vines, whether grafted or on their own roots, the writer advises for the reconstitution of vineyards, methods which, though now somewhat out of date, proved very satisfactory when applied by him to a vineyard of some 60 acres.

The first of these methods consists in planting cuttings in the open ground in such numbers (4 800 per acre) that gaps can be replaced by the same cuttings, and then proceeding to plant another area of the same size (placing the cuttings 5 ft. 3 in. apart each way, which will give 600 per acre).

The second method consists of making a nursery, where the percentage of successful grafts is from 80 to 90; while the third consists of using rooted stocks "in holes in winter" and grafting 5 or 6 cuttings after.

529 - **Vine Growing in the Province of Mendoza, Argentina.** — ROBINSON CISCO J. and LAHITTE, EMILIO: in *Boletín del Ministerio de Agricultura*, No. 11-12. Buenos Aires, 1912.

The totals are here given, for the whole province of Mendoza some of a series of tables containing the data for every district province:

Cost of an acre of vineyard 3 years old.

When the work is done by contract,	£ 83
When managed by the owner	£ 55

Extent of vineyards.

Vineyards planted with French vines	110 982 acre
Vineyards planted with native (criollo) vines	21 288 "

Irrigated area in the province of Mendoza in 1912.

Already irrigated.	721 448 acre
To be eventually irrigated	732 884 "

Grape production of 1912.

	Quantity
White	15 123 627 lbs
Black	976 474 045 "
" Criolla "	100 647 533 "
	Value
Total	£4 245 850

Grapes exported in 1912:

White	140 755 lbs
Black	4 760 214 "
" Criolla "	3 776 870 "

Wine production of 1912:

	Quantity
White	1 027 211 gals
Red	69 273 826 "
" Criollo "	5 639 007 "
	Value
Total	£7 854 749

Chemicals used in the making of wine and their value.

Tartaric acid	2 233 594 lbs	worth	£153 872
Citric "	261 483 "	"	" 23 000
Tannin	51 188 "	"	" 5 097
Enophosphate	440 671 "	"	" 9 453
Metabisulphite	91 145 "	"	" 3 227
Clarifiers	9 938 "	"	" 226

The Use of Chemical Manures for Fruit Trees. Results of Experiments made in 1909 and 1910 by the Royal Agricultural Station of Magyaróvár, Hungary. — SZÁNYI, JÁNOS: in *Kísérleti Kötetmények*, Vol. XVI, No. 1, pp. 61-73. Budapest, January-February 1913.

In 1909, the Royal Agricultural Experiment Station of Magyaróvár experiments in different parts of Hungary on the use of chemical manures for fruit trees; the effect of the treatment was also noted in the following year.

The results obtained were as follows:

1) Under the continental type of climate prevailing in Hungary, the use of chemical manures increases the productivity of fruit trees. This is of especial importance for the trees on the vast sandy stretches of Hungary, where the poverty of the soil only allows a crop every second year.

2) Although the returns of one year show that the use of chemical manures is remunerative, it is impossible to determine the actual profit till after at least two normal years.

3) This manuring not only increases the quantity, but also the quality of the fruit.

The following table shows the increase in the yield of 100 fruit trees made by the station in 1 and 2 years respectively:

Districts	Apples	Pears	Plums	Apricots	Green-gages	Egriots	Quinces	Cherries
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Magyaróvár	—	287	408	1 530	1 250	—	855	—
Árkád	13 350	2 850	—	—	—	—	—	—
Óbuda	275	600	970	—	—	—	—	—
Ópusztás	1 450	8 800	3 300	5 850	—	5 850	—	8 800
Ópusztás	1 250	—	—	—	—	—	—	—
Ópusztás	4 400	4 550	—	1 100	—	—	—	—
Ópusztás	7 575	14 900	730	—	—	—	—	—

Data on the Cultivation of Citrus Fruit in the Province of Salerno, Italy. — BRIGANTI, G.: in *Italia agricola, Giornale di Agricoltura*, Year 4, No. 6, 1912-1913. Piacenza, March 30, 1913.

The citrus fruit plantations in the province of Salerno occupy an area of 4589 acres, without reckoning trees mixed with other crops. The production of fruit is 492 000 cwt., of which 275 500 cwt. are lemons, 157 440 cwt. lemons, and 59 000 cwt. tangerines; the total value is £198 000. The lemons grown along the coast of Amalfi are the best cultivation; the preparation of the land costs from £320 to

£ 800 per acre. In the Nocera district the best citrus fruit grown at rents reaching to £ 32 per acre; they generally consist of lemons and tangerines planted in alternate rows (about 240 trees per acre) and they are often interplanted with walnuts (32 to 40 per acre). The harvest continues from December to August. The oranges most common are the flattened orange (*Citrus Aurantium depressum* Risso), the shaped orange (*C. A. ellipticum* Risso), the Maltese, and the Sicilian orange. Almost all the lemons are exported to New York and to other foreign lands; two thirds of the oranges and tangerines produced are consumed in Italy; the rest are exported, chiefly to Austria-Hungary. The price of tangerines ranges from 6 to 12 shillings per cwt., that of lemons from 2s 10d to 4s per cwt. from December to March and from 8s to 12s and 16s per cwt. in summer.

- 532 - **Citrus Fruit Growing as a Commercial Industry in Southern Rhodesia.** - FARMER, C. E.: in *The Rhodesia Agricultural Journal*, Vol. X, No. 3, pp. 3-4. Salisbury, Rhodesia, February 1913.

The writer of the above is adviser on citrus cultivation to the Orange River Fruit Growers' Association, a company of the Orange River Fruit Growers' Association, South Africa Company; he gives a most encouraging account of the prospects of this new industry. Having had 18 years' experience in California, he considers that 5-year-old orange trees in Southern Rhodesia surpass 7-year-old trees in Florida both in size and in bearing capacity, notwithstanding the fact that the latter receive two dressings of fertilizer every year while the former remain unmanured.

- 533 - **The Peach in the South-East of France.** TSCHAEN, E.: in *Journal d'Agriculture pratique*, Year 77 (1913), Vol. I, No. 12, pp. 366-369. Paris, March 20, 1913.

On light and calcareous soils, the peach does well on its own root, but when the soil is a clay and damp, it is grafted on the plum rootstock in the case of dry soils, on the almond.

The writer enumerates the varieties of peaches grown in the South-East of France: a) soft peaches: Amsden, Alexander, Halle Early, Earliest of All, etc.; b) hard or Pavie peaches: Yellow Madeleine, White Pavie, Brunet Pavie, Yellow Saint-Michel Pavie. He then deals successively with the height and shape to be preferred for the trees, winter pruning, picking and yield, diseases and insect pests.

- 534 - **Bartlett Pear Precooling and Storage Investigations in the Rogue River Valley.** - STUBENRAUCH, A. V. and RAMSEY, H. J.: in *U. S. Department of Agriculture, Bureau of Plant Industry, Circular No. 114*, pp. 19-24. Washington, February 1913.

As the result of a one season's experiment in Oregon, it was found that if picked when fully ripe, carefully handled, and cooled without delay, Bartlett pears may be stored for four weeks at the shipping point, and being subsequently sent in refrigerated cars to the Eastern markets will arrive in a sound marketable condition.

(1) See also No. 269, B. March 1913.

The Reine-Claude Green Gage. — RABATÉ, E.: in *Le progrès agricole et viticole*, no. 30, Nos. 10 and 12, pp. 311-315 and 365-378, Montpellier, March 9 and 23, 1913. After a few words concerning the fruit and production of this plum the writer deals at length with the method of pruning the Reine-Claude variety and concludes as follows:

While the shaping of the tree is a rather difficult and lengthy task, further pruning is simple and easy and very favourable to the production of fine market fruit.

The Cultivation of the Japanese Medlar. — OINOUE, J.: in *Revue Horticole*, no. 85, No. 5, pp. 106-107, 3 figs. Paris, March 1, 1913.

The Japanese medlar is a low tree, often hardly more than a shrub, with strong, thorny branches; in the wild state, it forms a pyramid. The leaves are large, long and pubescent on the lower surface. This tree grows well on nearly all soils, provided they are not completely

barren. In Japan, it is usually grafted on quince or medlar, never on *Crataegus Azarolus* (Neapolitan medlar). It needs a fairly hot climate, but its flowering is not usually hindered by early autumn frosts.

The Japanese medlar is cultivated in the pyramid form, or simply as a bush, and is little susceptible to insect attack or disease.

At the present time medlar plantations of greater or less extent are met with in the provinces of Nagasaki, Iyo, Shizonoka, Osaka, Kanagawa and Chiba.

The chief varieties now grown are the following:

Shikikan. — Fruit very sweet and juicy, large, ovoid, yellowish-white in colour; it has four stones. The tree is very vigorous and productive; it grows in pyramid form, and is rather dwarf.

Utsugi-Biwa. — Fruits generally five in a bunch, ovoid, a little more oval than those of Tanaka-Biwa; orange-yellow in colour, very juicy and sweet. The tree is vigorous and fairly productive.

Yamaguchi-Biwa. — Fruit very large, round and of excellent quality, very sweet. There is usually only one stone, except in some fruits at the top or bottom of the bunch; the fruit is yellowish white and has a very pleasant flavour; it ripens very early. The tree is very vigorous and productive, and is dwarf in habit.

Tamoura-Biwa. — Fruit fairly large, very sweet and juicy, and of yellowish colour. The tree is fairly vigorous and productive on calcareous soils.

Tanaka-Biwa. — Fruit very large, sweet and juicy, with few stones. The tree grows vigorously, but is not very prolific. This variety is the most prized and is much grown throughout the country.

Wase-Biwa, or Early Bibasse. — Fruit small, very early, rather acid.

Wase-Ō-Biwa, or Large Early Bibasse. — Fruit large, very sweet, yellowish in colour. Tree very prolific, much prized.

Sangatsu-Biwa, or March Bibasse. — This is the earliest variety which begins ripening in March. Fruit rather small, dark yellow. Tree very vigorous and prolific. This variety is adapted to the southern part of Japan and of France, as well as to Italy and Spain.

- 537 - **The Condition of the Olive Groves in the Lepino-Fontine and (Campobasso) Zones.** - BRACCI, FL.: in *Bollettino del Ministero di Agricoltura, Industria e Commercio*, Year XI, Series C, Parts 11 and 12, pp. 30-32 and 33-35. November and December 1912.

After having described the deplorable condition of the olive groves of these two districts, which have been left almost entirely without cultivation, the writer gives a detailed account of the cultural measures and parasite control necessary in order to keep olive trees in bearing.

- 538 - **The Persian Walnut Industry of the United States.** - LAKE, E. R. - *Department of Agriculture, Bureau of Plant Industry*, No. 254, pp. 170. Washington, February 1913.

A complete survey of the walnut industry, including an account of the history and distribution of the crop as well as a description of varieties and full cultural details.

- 539 - **The Exportation of Fruit from Portugal between 1906 and 1910.** - *da Associação Central da Agricultura Portuguesa*, Second Series, Vol. II, No. 1, pp. 1-10. Lisbon, January 1913.

This bulletin contains statistics of the amount and value of oranges, pineapples, apples, grapes, chestnuts and other fruits exported. The total value of these in 1910 was £186 312.

The Queluz School of Pomology, which is under the direction of the « Associação Central da Agricultura Portuguesa », as well as the Government Experiment Stations, have begun selecting those varieties which are most prized in the markets.

- 540 - **The Forests of Bulgaria.** - WEISS, W. K.: in *Oesterreichische Forst und Jagdzeitung*, Year 31, No. 12, p. 106. Vienna, March 21, 1913.

The total area of the forests of Bulgaria is 7 515 418 acres, are divided as follows:

State property	2 230 950	acres
Communal property	3 867 871	"
Private property	1 284 075	"
Property of institutions	132 522	"

The State forests are chiefly situated in the mountainous districts of the Stara Planina, Rhodope and Rila mountains and consist of separate forests. The communal forest land lies more in the south-west of Bulgaria and includes 2966 forests. The private forests are scattered over small areas in the plain. The Bulgarian forests consist of about 30 per cent. of the total area of the country, but in the south of the country they amount to 60 or 65 per cent. There are about 10 acres of forest per inhabitant; this proportion seems to be very satisfactory, but the smallness of the population must be taken into account.

With regard to the composition of these forests, deciduous trees far outnumber conifers, and the following species are those which

above 500 m. (1600 ft.) oak and beech predominate; besides there are ash, poplar, plane, elm and willow; conifers are represented by pines, firs and spruce.

The vegetation can be divided into four zones;

1) A warm zone extending to 400 m. (1300 ft.) above sea-level. There were formerly vast forests, but much of the land is now devoted to agriculture; this zone has an east European vegetation.

2) A temperate zone, where the vegetation differs very little from European flora, and some very large old trees still remain.

3) A zone reaching to 1300 m. (4300 ft.) above sea-level: besides oak, beech is the prevailing tree; owing to its growing in places of access, it is not readily turned to account; there are here small stands of pure beech, or of beech mixed with ash and plane. In the southern declivities of the Pila and Rodope mountains are clothed with pines; in the higher parts of the beech zone, spruce occurs.

4) Zone between 1300 and 2000 m. (4300 to 6500 ft.). This begins with beech mixed with spruce, the latter often forming thick stands; in the lower ground, grow firs, among which occurs *Pinus Peuce*, either in clumps, or as scattered individuals; above, at 1800 m. (5900 ft.) *Pinus Mughus* intermixed with spruce.

The ownership division from the point of view of altitude is shown in the following table, which gives the areas in acres.

	Up to 400 m.	400 to 1000 m.	1000 to 2000 m.
State property. . . .	732 797	858 821	638 841
Communal »	1 955 542	1 153 134	759 191
Private »	776 685	443 260	196 645
	3 465 024	2 455 224	1 594 677

As regards the height of the timber, the forest may be thus classified:

1 620 512 acres with trees of the average height obtaining in Europe;

1 894 414 acres with smaller trees, of which one quarter are conifers.

The annual increase of a large hardwood forest 100 years old and of average quality and normal density is 43.6 cub. ft. per acre, that of a slow growing wood of 20 years is 35 cub. ft. per acre of hardwood. The annual yield of coniferous high-forest 100 years old is about 81 cub. ft. per acre, while a slower growing 20 years' old conifer forest produces 59 ft. per acre.

The total forest area of Bulgaria is estimated as worth £23 800 000. Bulgaria exports all kinds of hard and soft woods, both as raw material and in the form of manufactured articles. From 1898 to 1902, 29 730 tons of timber, to the value of about £47 784, were exported, while the total during the same period reached 36 000 tons, worth £76 000. Exports have steadily declined, sinking from £140 443 in 1898 to £46 in 1902. The value of the exports, on the other hand, rose from £20 in 1898 to £61 996 in 1902.

Bulgaria chiefly imports soft wood and in the form of manufactured articles; during the above-mentioned period, 75 per cent. of the imported was of this kind, while 50.5 per cent. of the exported was deal. Of late years, the wood industry of Bulgaria has increased but formerly only small articles of common use were made in home industry.

The timber of the State and communal forests is felled according to a plan drawn up by the ministry. The State either fells in its own and the communal forests, or else gives the right by tender, to a contractor; often the right of felling is disposed of by agreement to large contractors.

Afforestation is done on the initiative of the State and carried out under the supervision of the latter. As the ground is rich in nutrients, the young trees soon make strong roots and grow well.

Regeneration in already existing forests is done by natural means according to a system of periodical felling, which is settled by the ministry according to the requirements of the different species of trees.

The State employs 500 foresters in the care of its forests, and is entrusted with those belonging to the communes; this amounts to one forest guardian for every 4 461 acres of State forest and for every 1 814 acres of the communal woods.

In spite of all regulations to the contrary, the peasants, as still allow their cattle to graze where they like, without the least restriction for the young plantations. The writer considers that if systematic and energetic measures were adopted, the time would yet come, when forests would play a part of considerable importance in the State and the capital invested would bring in a satisfactory return.

LIVE STOCK AND BREEDING.

- 541 - **An Enquiry made in 1912 to Determine the Causes, Frequency and Prevention of Rickets in Foals in West Flanders: the Measures to be Taken to Hinder the Spread of the Disease.** — ZWAENEPOEL: in *Annales de Médecine Vétérinaire*, Year 62, No. 2, pp. 69-87; No. 3, pp. 129-151. Ixelles-Bruxelles, February and March 1913.
Compiled from observations made on the subject by 23 horse-bre

- 542 - **The Disinfection of Hides and Skins Containing Anthrax Spores.** — in *Deutsche Schlacht- und Viehhof-Zeitung*, Year 13, No. 7, pp. 97-98. Berlin, February 1913.

Schattenfrohn recommends common salt and hydrochloric acid for the destruction of anthrax spores. Another method worked out by Seymour-Jones consist in placing the hides for a long time in a mixture of formic acid and corrosive sublimate. Moegle (Stuttgart) set himself the task of testing the methods of both investigators and, at the

he tried to substitute formalin for corrosive sublimate in Sey-Jones' method. Zeeb describes his experiments in the above article.

Piroplasmosis in Sheep. — VON BATZ, STEFAN: in *Zentralblatt für Bakteriologie, Bakteriende und Infektionskrankheiten*, Vol. 68, Part 2, pp. 194-200. Jena, March 1, 1913.

The writer's researches have proved that the sheep disease caused by *Tropasma ovis*, which occurs in Rumania, Bulgaria and Turkey, as in Italy, Dalmatia and France, also exists in Hungary. Detailed investigations have shown that the disease can assume an acute and a chronic form.

The Passage of Products of the Digestion of Albuminoids from the Mother to the Foetus. — BUGLIA: in *Biochemische Zeitschrift*, Vol. 48, Part 5, pp. 362-372. Jena, February 11, 1913.

The above-mentioned investigations into the passage of non-albumin nitrogen through the placenta were carried out at the Physiological Institute of the University of Naples. The writer injected into the femoralis of four bitches, far advanced in pregnancy, artificial products of the breaking up of albumen, which no longer possessed any osmotic properties, and then sought to discover these products in the blood of the foetus.

The injections were performed with extreme slowness, and with relatively large quantities.

After the injections were concluded, the body of the bitch was bled, the large vessels were ligatured, and the still living foetus was removed and beheaded.

The blood from the blood vessels of the neck was allowed to coagulate of its own accord, and then examined for albuminous and non-albuminous nitrogen. Before and after injection the albuminous and non-albuminous nitrogen content of the bitches' blood was determined. In some cases, the writer also examined the urine of the bitch, as well as the amnion and allantoic liquids.

For a comparison the blood of foeti and their mothers, which had received no injections, or only common salt injections, was afterwards examined as to its albuminous content. From a comparison of the results of the experiments, it was clearly proved that a portion of the albuminous nitrogen injected into the mother's blood had found its way into that of the foetus.

Utilization of Food by Zebu. — PUCCI, C.: in *L'Agricoltura Coloniale*. Year VII, No. 1, pp. 11-28 + 2 figs., Florence, January 1913.

The writer, Director of the Stock Breeding Laboratory of the Royal Superior Institute of Experimental Agriculture at Perugia, having been put in charge a young zebu bull of about two years of age and belonging to the Gujerat breed, which was completely accustomed to its surroundings, set himself the task of observing the power of these

Indian cattle for digesting various food stuffs in comparison with capability shown by European breeds in this respect.

As a control was selected a young Podolian bull 20 months from Todi, the result of a cross between the Val di Chiana (Un variety) and the Maremma breeds.

At the time of the experiment, the weight of both animals was the same.

The experiments were divided into two series: in the first, the animals were fed on average quality meadow hay; in the second, on hay and earlnut cake.

Both animals were kept in the same shed and their dung and urine were collected with particular care.

After having ascertained the amount of food consumed by the two bulls, each was assigned a similar ration, according to its requirements.

The forage was examined first and subsequently the dung and urine.

The results of the first series of experiments proved that the two subjects showed no special difference in their power of absorbing various substances, with the exception of fat, of which the zebu absorbed a greater proportion.

Nevertheless, the latter animal showed a slight difference in its absorption of nitrogen, while the former absorbed more nitrogen-free extract and mineral substances.

Both bulls evinced a gain in nitrogen; this was, however, more noticeable in the case of the Todi animal, since the zebu consumed less of this substance.

In the second series, with meadow hay and earlnut cake, the zebu absorbed more nitrogen, fats, nitrogen-free extract and mineral substances than did the other bull, which showed a slightly higher capacity for the absorption of cellulose. Further, the zebu showed a considerable larger gain in nitrogen than the other animal.

Both bulls, on receiving more concentrated rations, increased their absorption of almost all the nutritive principles, but the zebu did this to the larger extent. This proves its greater aptitude to digest and assimilate nitrogenous matters, fats, nitrogen-free extract and mineral substances. This agrees with the two animals' increase in weight and the proportion of nitrogen acquired by them during the experiments.

It is well to mention in conclusion that the two bulls drank different amounts; the zebu always required less water, which according to the writer, points to its being adapted to living in hot climates subject to periods of drought.

3. Drawing Up and Printing of Pedigrees. — WILSDORF: in *Merckblatt der Deutschen Gesellschaft für Züchtungskunde*, and in *Zeitschrift für Gestützkunde und Pferdekunde*, Year 8, Part 3, pp. 63-67. Hannover, March 1913.

A glance at the more recent literature dealing with the subject of breeding shows that the pedigrees are drawn up and printed in different ways, which greatly increases the difficulty in tracing lines of ancestry.

The writer suggests that pedigree tables should be drawn up uniformly in the manner adopted by the "Institut für Zuchtstudien" and "Deutschen Gesellschaft für Züchtungskunde" in the publications dealing with animal breeding.

The form suggested by the writer, is given on page 779 on a somewhat smaller scale, on which is shown the pedigree of "Undine." The following points should be noticed in drawing up and in using these pedigree tables:

- 1) Pedigree tables must be symmetrical in all their parts.
- 2) The normal-sized form (1) for manuscript entries is 7.3×4.6 in. A black line should enclose the table, which should be divided in the centre by a thick horizontal line drawn from the line marking the first division (i. e. from left to right). In the case of short names, forms of half or a quarter the size are sufficient.
- 3) The list of ancestors should always be printed with the name of the male up; the descendant (Undine 8348) on the left in the first longitudinal division.
- 4) The father of the offspring is entered in the upper half of the longitudinal division, the mother in the lower half, and the grandparents are then entered in the 4 compartments of the third longitudinal division.
- 5) In the first three narrow divisions (on the left) the names and numbers must be written in a perpendicular direction; but horizontally in the three following divisions; the names in the latter divisions should be written immediately before the line separating off the small divisions on the right.
- 6) In the 1st, 2nd and 3rd longitudinal divisions, the names are written in each compartment, in such a manner that the dividing line which cuts the right edge of the table, reaches the centre of the compartment with the number.
- 7) The numbers are placed, without the letters "No.", exactly below the names in divisions 4 and 5; in the case of longer names, the number can come immediately below the latter.
- 8) In the 6th longitudinal division, the parents of the animals are entered are frequently given, in which case it is necessary that the name of the father should be written above that of the mother on the right half of the division; a more distant progenitor can be entered

¹ To be obtained from the Geschäftsstelle der Deutschen Gesellschaft für Züchtungskunde, Berlin-Halensee, Halberstadtstr. 3.

on the right; thus in the 6th division of the accompanying pedigree table belonging to "Undine," beside Olga 1 are given the names of her parents, Matador 589 and Olga 4817 and, further, their father's name, Primus 91 is also clearly entered.

If the names are written small, there is room in the division for several generations of ancestors.

9) Wherever the name of an ancestor is missing, a short horizontal stroke should be made in the right place in the written pedigree (see in the cases of Robert and Hulda). In printing, these strokes should be omitted. They should only be used when it is certain that the names of the ancestors are unknown.

10) Should more distant ancestors, or other important relations or combinations be known in the case of the animals figuring in division 6, which it is impossible or undesirable to enter, the signs \sim should be entered behind the name of the animal in the manuscript pedigree (See Primus 91 next to Olga).

11) Entries in the pedigree tables must be written legibly.

12) The reading of manuscript pedigrees is greatly facilitated if the names do not adjoin the lines. In the sixth longitudinal division sufficient space should be left (about 5 mm) to allow of the insertion of figures if necessary.

13) In the longitudinal divisions 4 and 5, the initials of the animals of equal length should come directly under one another, and the same arrangement should be observed in the case of all the initials in the divisions.

14) The names of animals which occur many times in a pedigree can be represented by filled or unfilled signs; these must be entered behind the numbers of the animals in divisions 2 and 4, above the initials of the name in divisions 3 and 5, and before the names in division 6. Large signs are used for the nearest ancestors and smaller for the more distant ones, which are entered further to the right. Animals which are related, but have a somewhat different line of descent, are represented by unfilled signs, in which the amount of "blood" they have in common with their mate, can be expressed by a fraction.

15) The compositor must use exactly the same signs as are given in the written pedigree. Larger and smaller signs of the same kind must only be used for the same animals, or related ancestors.

16) In manuscript pedigrees, the signs which denote ancestors or relatives on both the father's and mother's sides, should be written with black ink (e. g. Matador); signs which only represent ancestors on one side should be red (e. g. Elso 2011); those which only represent a quarter or an eighth of common ancestry are coloured (Sturm 1213).

(1) Example: Enzian 4237 has $\frac{1}{2}$ the blood of Gregor 2358 and $\frac{1}{2}$ that of Elmar 1656, or he has $\frac{1}{4}$ of the blood of Elmar 1656, Gesine 6404, Matador 589 and Elmar 1656. These animals, only Gesine 6404 does not appear in the pedigree of Editha 1813. Enzian 4237 has therefore $\frac{3}{4}$ of the same blood as the last-mentioned animal.

Lilao 11 34

Piso 2011 (red)

Oskar
1535

Robert
1325

Matador 589

Hulda
7829

Bernhard
778

Elvira
5042

Ajax 428

Lottchen 2415

Falk 71

Lotte 783

Robert 1325

Matador 589

Hulda 7829

Bernhard

Emma 3508

Eva 3091

Roland 1088

Matador 589

Alma 2588

Olga I

Matador 589

Olga 4817, Pr 91

—

—

Sarah 4688

Eginhard
2072

Oskar
1553

Eleonora
5392

Heinrich
1386

Stadtwyk
9274

Stadtwyk
2395

Caesar 1710

Sturm 4681

Wodan
825

Ajax 536

Pauline 2843

★ Primus 91

Diana 979

✦ Alma 2588

Ajax 536

Pauline 2843

★ Primus 91

Diana 979

Hertha 986

Elmar 1656

Gesine 6404

Matador 589

Einhorn

—

—

son of

Matador

Einhorn

Walküre 7819

Edelweiss 6903

Enzian 4237

Wodan
825

Clara
3170

Eiche
1811

Elmar
1654

Elfriede
7495

Editha 1817

17) The compositor may abbreviate long names in division 6 no other alterations are admissible. Abbreviations can only be where the names have occurred in full in earlier divisions of the form. Should the space in division 6 be insufficient for the names and numbers and signs of further ancestors, the signs alone are entered. Entries of the pedigree, breeding information and premiums should be entered on the back of the form. But in the 1st longitudinal division (allowing a suitable interval) the name of the breed can be entered below (on the right) and the date of birth (above) on the left.

547 - **Live Stock Breeding in the Sierra do Norte in Peru.** — BROOKS, A. in *La Riqueza Agrícola*, Vol. II, No. 13, pp. 867-873. Lima, January 1913.

On account of the distance of the Sierra do Norte from population centres and of the lack of roads, stock breeding in this region is practised on primitive lines. The estates are very extensive — 25 000 and 50 000 acres; sometimes the same owner possesses adjacent estates reaching from the coast to the mountains.

The estates are divided into "campos," "potreros" and "inviernas." The "campos," which occupy the greater area, are not enclosed and they are grazed during the rainy season. The "potreros" are the best pastures and are mostly surrounded by dead hedges and ditches. They are reserved for the use of weak and young animals during the dry months; the "inviernas" are irrigated meadows enclosed by dry stone walls and sown to "paja chilena" or "parada" (*Stipa* spp.) and devoted to the fattening of the cattle to be sold during the year. Sometimes the "potreros" also are sown with "paja chilena," or settlers are allowed to grow cereals in them on condition of leaving the stubble for forage.

The "inviernas" are sown by hand, a pick being used to prepare the soil which is too irregular and too stony to be ploughed. The ground is resown every 10 to 15 years.

It is customary to give any agriculturist who settles on the estate, as farmer, a certain extent of land, on payment of a trifling rent (10 soles that is 2 to 20 shillings) and of a share of the produce (wheat and maize); the farmer has also to assist in the performance of the work, his share amounting in all to 30 days per annum, and to pay 1 sol (about 2 shillings) for grazing rights per head of cattle per annum. Strangers pay twice as much. This promiscuity is often injurious to the cattle of the estate, which gets crossed with inferior animals.

Once a year, at the approach of the rainy season, a general inventory is made of the live stock, taking the herds — that is the cattle — entrusted to one herdsman — in succession. It is then that the calves are branded and eventually castrated. In some estates the cattle are rounded up a second time at the end of summer, when the calves to be fattened are picked out. Where horses and cattle are bred, inventories are made separately.

It takes from 3 to 6 months to fatten cattle in the "inviernas."

The cattle of the Sierra is smaller and not so well built as that of most, where selection and crossing with improved breeds is practised. Nevertheless, even in the Sierra do Norte, a breeder has introduced excellent Hereford bulls.

The chief and most profitable industry is the fattening of cattle, though some cheese is made. The cows are milked only during two or three months in the year and they yield barely a quart of milk per day. Cheese and butter are made very imperfectly and with the most elementary utensils.

A good deal could be done for the improvement of breeding in the Sierra do Norte. The climate is mild, the temperature rarely sinking below 50° F. and the rains are abundant in the summer; consequently, with a relatively small amount of labour, plenty of pasture might be had all the year round. There are no cattle diseases. The liver-fluke is the parasite most to be feared.

Sheep breeding would find favourable conditions, especially in the higher part of the Sierra, but it is not so profitable as cattle. Some years ago Merinos were introduced, but as no proper selection was bestowed on the crossing, the flocks soon degenerated, and they have not much more wool than the native (criollo) breed. The death rate is rather high, chiefly owing to staggers, so that often the yearly increase is not above 10 per cent. There are also many ticks. The average yield of washed wool per head is from $\frac{1}{2}$ to 1 lb. per head. It sells at 8 to 10 soles per arroba ($7\frac{1}{2}$ d to $9\frac{1}{2}$ d per lb.) The price of sheep is about 4s and of fat sheep about 6s.

The Fat Stock at the General Stock Show in Paris. — VOITELLIER: in *Vie Agricole et Rurale*, Year 2, No. 14, pp. 381-384. Paris, March, 8, 1913.

His report gives advice as to fattening and exhibiting stock, as also information respecting the success obtained with various French breeds of cattle, sheep and pigs.

The Prussian Half-Bred Horse. — GANZERT: Unser Halbblut. — *Illustrierte Landwirtschaftliche Zeitung*, Year 33, No. 20, p. 183. Berlin, March 8, 1913.

The writer mentions the criticisms, which are often passed upon the Prussian horse and shows how its early maturity may be turned to account without detriment to its excellent qualities.

East Prussian Studs (and the Supply of Horses for the Army. — GOLD-
CK: in *Illustrierte Landwirtschaftliche Zeitung*, Year 33, No. 24, pp. 224-225, Berlin, Feb. 22, 1913.

Information respecting the development of the East Prussian rearing studs and the present breeding of remounts, together with an estimate of the importance of this work for the army. The last section is a list of the best private studs.

551 - **The Austrian Cattle Census of December 31, 1910, and the Fluctuation in the Number of Cattle since 1900, especially as regards Milk**
LEDERER: in *Österreichische Molkerei-Zeitung*, Year 20, No. 5, pp. 65-66, March 1, 1913.

In 1910, the total number of cattle in Austria amounted to 9,160,185; of these 4,901,856 were cows and 1,154,283 steers. In comparison with the 1890 cattle census returns, there is a decrease of 3.7 per

This falling off is chiefly in steers (20.7 per cent.) and bulls (10.5 per cent), for the cows have increased 3.3 per cent., owing, in the writer's opinion, to the increase of dairy-farming. The number of cows has increased from 50 per cent. to 53 per cent. of the total horned stock, but this increase has not kept pace with the growth in population. While in 1890 there were 181.5 cows per 1000 inhabitants, this number had fallen to 171.6 at the time of the last census.

The number of cows has decreased everywhere in the Alps, especially in Lower Austria. This is especially noticeable in Carinthia (7.1 per cent.), in Carniola (6.8 per cent.), and in the Vorarlberg (6.8 per cent.).

In the Sudeten and Carpathian districts a considerable increase has been observed: 7.8 per cent. in Moravia, 5.8 per cent. in Galicia, 9.2 per cent. in the Bukowina. In Salzburg, there are 329 cows per 1000 inhabitants (the maximum), in Upper Austria 323, in Carinthia 222, in the Tyrol 229.5 and in the Vorarlberg 226.8, while in Dalmatia the number sinks to 45.5 (minimum).

Rearing young cattle seems to be most extensively practiced in Styria, Carniola, Görz, Gradiska, Bohemia, Moravia, Silesia, Galicia and the Bukowina.

552 - **A Contribution to the Knowledge of Tarantais Cattle from the Technical and Economic Standpoints.** - HOFFMANN: in *Mitteilungen der k. k. Hofschule für Bodenkultur in Wien*, Vol. 1, pp. 309-327, Vienna, January 15, 1913.

The detailed investigations of the writer led to the conclusion that Tarantais cattle ("Race tarantaise," or "Race tarine") of southern France are not, as Boucher supposed, the result of a cross between "Race Jurassique" (Swiss spotted cattle) and the "Race des Alpes," but a separate pure breed. In order to determine the descent and relationships of these cattle, the writer made comparative examinations of their skulls, of which the results justified the conclusion that the Tarantais cow is a direct descendent of the old lake-dwellers' cattle, which were found everywhere throughout Savoy. Some primitive characters of the lake-dwellers' cattle seem to be still latent in the Tarantais. The examination of all the skulls examined showed a considerable improvement in the type belonging to the pre-historic breed. The writer especially noticed a shortening of the face and a corresponding broadening of the head and back of the head, from which he came to the conclusion that the short-horned breed was not only more highly developed, but that its development had proceeded along brachycephalic lines. This small amount of brachycephaly is not, in his opinion, to be attributed to a mixture of

ore the Tarantais cattle should be placed in the zootechnical system in the third and fourth forms of the type "*Bos taurus europaeus*." affmann gives a detailed account of the Tarantais breed, which has been little dealt with in books on cattle.

The First Show of the Red Cattle of Central Germany at Biedenkopf.—

USER: in *Deutsche Landwirtschaftliche Presse*, Year 40, No. 12, pp. 135-136; No. 13, 150-151. Berlin, February 8 and 12, 1913.

is is a report of the first exhibition of breeding cattle, which was y the Federation of Breeders of the Red Cattle of Central Germany edenkopf last autumn. To this Federation, which was founded eighteen months ago, there are now affiliated 22 Breed Associations about 10 000 head of cattle. Its object is the improvement, by of selection, of the breeding stock of the native red cattle, which pt in the mountainous districts of Central Germany and in Silesia. im of the Federation is to obtain an animal good for milk and production and also for work, and which is better adapted to eds and economic capacity of the different breeding districts.

a attempt is being made to unite higher milk yield, greater weight, er formed hind quarter, a more powerful muscular development of highs, as well as earlier maturity, preserving at the same time xial aptitude to draught purposes. The live-weight of three-year- als should be from 1320-1980 lbs. and that of five-year-old cows 880-1540 lbs. The head and neck should be moderately long and y attached, the fore quarter and chest deep and wide, the shoulder and sloping, and the back straight. A broad rump, long pelvis, dy formed udder, clean powerful limbs with short pastern, and hard are also required of the typical red cow of Central Germany.

he proof that the Federation is not aiming at impossibilities has given, according to the writer, by this first show, where a considerable number of animals were exhibited, which have nearly attained breeder's aim. The report contains pictures of many of the breed-tile shown.

The Slaughter of Cows in Calf and its Influence on Beef Production.—

USER: in *Deutsche Landwirtschaftliche Presse*, Year 40, No. 13, pp. 149-150; No. 14 p. 159-160. Berlin, February 12 and 15, 1913.

In 1910, Dr. Buchem drew up statistics of the number of in-calf slaughtered in the Cologne slaughter-house. He extended his in-ations to the weight of the uterus, as well as to the weight and : the foetus. The statistics showed that 16.5 per cent. of the cows n calf, and most of them were not over four years old. With ing age, the writer found a decrease in the number of cows in laughtered. The number of cows in calf slaughtered was larger in er and smallest in June. The annual average was exceeded in mber, November, December and January, from February onwards number fell below the average; and from July, it again rose notice-

ably. The pregnancy was usually of 3 or 4 months' duration, often as much as 8 or 9 months.

The weight of the uterus with the foetus was, in the case of 3 months' pregnancy, 9 to 15 lbs. The uterus of cows not in pregnancy averaged $2\frac{1}{2}$ lbs. The extra weight of the uteri due to pregnancy was 33,000 lbs. The total number of foeti weighed 11,850 lbs. If these results be applied to the whole country, as may reasonably be seen, that similar or the same percentages have been obtained at many other slaughter houses, it follows that 298,546 cows in calf were annually slaughtered in Germany; consequently over 1000 tons of calves are lost by the destruction of the foeti. The writer considers that if man farmers would be able to produce and supply all the meat required by the population, if fewer pregnant cows were slaughtered.

In order to attain this end, Dr. Buchern recommends the declaration of the meat of pregnant animals and the legal application of a bounty or warranty to cases of the sale of cows in an advanced state of gestation.

555 - Influence of Alpine Grazing and Weather on the Milk-Yield of Cows

ULMANSKY: Über den Einfluss der Alpung und der meteorologischen Faktoren auf die wirtschaftlichen Leistungen von 27 Kühen der Anstaltsherde in Rotholz. *Mitteilungen der Landwirtschaftlichen Lehrkanzeln der K. K. Hochschule für Bodenkultur in Wien*, Vol. 1, Part 3, pp. 339-391. Vienna, January 15, 1913.

During the summers of 1910 and 1911, the writer made fortnightly test milkings and determinations of the fat content of the milk of the cows at the Rotholz Provincial Agricultural Institute in the Tyrol. At the same time, the meteorological conditions were closely observed in order to determine whether they had any influence upon the milk performance.

The animals belonged to the grey-brown mountain breed and were kept in the greater part of the summers in question on an Alpine meadow. Only 6 cows remaining in the valley. All the cows were weighed at the beginning and end of the grazing period, and the weight of the calves at birth was ascertained.

From the tables and diagrams giving the milk yield and fat content of the cows and also the different meteorological factors (temperature, atmospheric pressure, precipitation, etc.), practically no regular influence of the weather was observed upon the amount of milk or the fat content of the milk can be determined. Snow was the only factor which reduced the milk yield.

The cows which had grazed on the alp gave a little less milk than those which had been kept on the valley pastures, but the fat content of their milk was slightly higher.

556 - The Variations in the Composition and Properties of the Milk of Individual Cows. - ECKLES, C. H., and SHAW, ROSCOE H. U. S. Department of Agriculture, Bureau of Animal Industry, Bulletin 157. Washington, 1913.

The writers investigated the milk of 7 cows of different ages and breeds during about a fortnight (sometimes also for a shorter period).

ler to ascertain the composition of the milk and the variations in protein, sugar and fat content, as shown by the Reichert-Meissl, and saponification values and the melting points. The details given in tables.

The Milking Tests of Tyrolese Cattle-Breeding Associations. KUBERAT: in *österreichische Landwirtschaftliche Zeitung*, Year 63, No. 24, pp. 292-293, Vienna, March 22, 1913. This article gives the data collected during a period of five years, referring to the different breeds of cattle kept in the Tyrol.

The Moscow Sheep Breeders' Congress and Exhibition. - TELSCHOW: in *Schrift für Schafzucht*, Part 3, pp. 49-57, Hannover, March 1913.

In October 1912, a Sheep-breeding Congress for the promotion of industry in Russia was held at Moscow in connection with an exhibition of sheep, which included a scientific section and one devoted to demonstrations connected with the wool industry. During the sessions of the Congress, at which the writer was present, much stress was laid on the fact that Russia did not require any more to import sheep or in any case only to a limited extent. There are, at the present time, 87 million sheep in the country; they may be divided into two categories, producing fine and coarse wools respectively.

The first type there are 6 millions, including different breeds of sheep. The other 81 millions consist of short-tailed, fat-rumped, long-tailed and long-tailed sheep, of which the last are bred for meat, wool and fat and also for their fur. From the information supplied to the Congress, it appeared that sheep-breeding had only declined in the districts where pure bred Merinos were kept. The proportion of sheep in the population varies in different districts: in some there are 30 sheep per inhabitant; in others 200, this very high figure occurs in places remote from centres of communication, and it was part of the work of the Congress to open up such districts.

The Russian Merino sheep, to which the writer devoted special attention, is a typical exclusively wool-producing animal. As flocks of sheep only occur isolated in Germany and the German breeder's aim is usually different from that of the Russian farmer, there is no question of bringing Merinos into Russia from Germany.

English breeds and their crosses have not proved very successful in Russia, so that breeders in that country have to resort, more or less, to the systematic improvement of the numerous native breeds of

Among the many breeds exhibited, the writer describes the Kurdjuck and Tadjik breeds.

The large Kurdjuck sheep; is a native of South Russia, and belongs to the fat-rumped type; it is reared for meat and fat only, as its fur is not so valuable but it is resistant and thrifty. It reaches its full size at the age of 18 months. The measurements taken by the writer of an adult ram

were as follows: height at withers 35 inches, breadth of chest, depth of chest 15.3 in., total length, without cushion of fat, 3 ft 0 in., with fat cushion, 3 ft 4.5 in., the latter can weigh up to 33 lbs.

M. Telschow opines that this breed would also be profitable in Germany, especially if crossed with the native breeds, and would be suitable in heath districts, where the food conditions are very variable. The sheep are also suitable for crossing with the South-West African tailed breed.

Many crosses have been successfully made in Russia, especially with Merinos.

Wallachian sheep are chiefly bred for their fur, and in addition producing the valuable Pollschu ram fur, they also furnish a good amount of meat. The writer is of opinion, that these sheep might be kept to advantage also in Germany, and after giving a short account of many exhibits dealing with sheep breeding, which were shown at the Wool Industry Section, he expresses the hope that one day, on the occasion of such a Sheep Exhibition, an International Sheep Breeding Congress may also be held in Germany.

559 - The Improvement of the "Mangalicza" Breed of Pigs in Hungary. KOVÁCSY, BÉLA, in *Mezőgazdasági Szemle*, Year XXXI, No. 3, pp. 172-173. Buda-Pest, March 1913.

This breed is much prized in Hungary for its fat-producing qualities and its adaptation to the conditions of climate, soil, and food obtainable in that country.

It has, however, the serious defects of not being sufficiently early maturing and to these causes must be attributed the expense of the Mangalicza breed. It was therefore necessary to cross it with another stock, which without altering the qualities which render pigs indispensable to Hungary, would at the same time increase their prolificacy and accelerate their growth. The necessary qualities have been found in the Lincolnshire breed; this was introduced for the first time and exhibited at a Show of breeding stock held in Hungary several years ago.

Of the various English breeds of pigs, the Lincolnshire is the one which fattens best, and most resembles the Mangalicza in its short, curly, white hair. Further, the crossing experiments made during a short time already showed that the cross-breeds of the first generation fulfilled the wishes of the breeders in every respect; the animals developed more quickly and were more prolific without in any way losing the property of easy fattening. On the contrary, with the same food they attained a heavier weight than pure-bred Mangalicza pigs.

Many Hungarian breeders, encouraged by these results, began to turn their attention to Mangalicza-Lincolnshire crosses. The following information has been given by two breeders respecting Mangalicza-Lincolnshire crosses.

At Balatonföldvár, M. Márkus kept pure bred Mangalicza and Lincolnshire pigs in the same herd and on the same food.

average weight of the pure bred young pigs when 8½ months old 19 lbs., while that of the Mangalica X Lincolnshire pigs of the same age was 165 lbs.; the hybrids thus weighed 46 lbs. more than the pure bred, which represents a difference in value of 17s. 5d. per head. The breeder considers that, when the pigs are one year old, the difference in their weight will amount to from 77 to 79 lbs. per head in favour of the improved Hungarian breed.

Mr. Kajdacs, M. Blascok selected 328 young cross-breds, of which 100 at the age of 6 weeks, was from 35 lbs. to 55 lbs. Their average weight at 6 months was 132 lbs.; they were used for breeding purposes at the age of 11 to 12 months. The castrated pigs weighed 550 lbs. at 14 months, and gained 392 lbs. in 4 months, while pure-bred Mangalica animals only weighed 484 lbs. per pair when 2 years old, and only gained 345 lbs. during the same time and with the same feed.

On the writer's farm, cross-bred pigs weighed from 220 to 264 lbs. at the age of 6½ months and from 282 to 330 lbs. when 7½ months old.

It is very difficult to acclimatize the pure-bred Lincolnshire in Hungary, especially when it is first imported; many animals have to be culled; but after the first year, they often prove excellent breeders. The sows are very prolific and rear their young very well; the latter grow up rapidly.

A Contribution to the Knowledge of the Length of Pregnancy in Goats. — BY DR. H. W. BERGER. In *Berliner Tierärztliche Wochenschrift* Year 29, No. 10, pp. 187-189. Berlin, March 6, 1913.

44 animals were the subjects of these investigations. Some of the animals belonged to the Harz breed, others were crosses between native animals and Harz, Saanen, and Toggenburg animals. The length of the period of pregnancy, which varied with the age of the goats, was from 164 to 166 days, from which fact the writer draws the conclusion that the estimations hitherto allowed for were too slight.

FARM ENGINEERING.

Trial of Bone-Mills. — KEISER: *Arbeiten der Deutschen Landwirtschafts-Gesellschaft*, Part 237. Berlin, 1913.

The competition held by the German Agricultural Society (Deutsche Landwirtschafts-Gesellschaft) on July 7 and 8, 1912, in the Central Veterinary-breeding Establishment of the Chamber of Agriculture for the Province of Saxony has shown that decided progress has been made since the last competition held in 1909.

The object of these bone mills is to reduce bones, both raw and cooked or boiled, to a form suitable to be used as food for animals (cattle, pigs, etc.).

Four hand machines and two power driven machines were tested. The tests were conducted as follows: firstly half a pound of bones of different kinds were given to each machine and the time each took to grind them was noted. Then a dynamometer was connected with the machines and observations were made as to the quantity of the material that could be ground in two minutes. Further the commission ascertained the performance per hour, the amount of power required and examined the quality of the meal produced.

The above tests yielded the following results:

A. HAND MACHINES.

No. 1. *Hand bone-mill with fly-wheel*: D. R. P. (1) No. 242 001. This mill grinds per hour 20 to 22 lbs of boiled bones, 11 to 13 of raw bones or 6 ½ to 9 lbs. of hard limb-bones. Its price is 28s. The opinion of the judges was as follows: Provided the device for fixing the mill be improved, machine No. 1 may be declared specially suitable to small concerns, as it yields a very good meal free from splinters and is also very cheap.

No. 2. *Bone-mill with crank*: D. R. P. No. 242 002. — The output is about 11 lbs. per hour. The price of the machine is 24s 6d. The judges' verdict was the following: This machine turns out a somewhat inferior to that produced by machine No. 1, but still good. Its output is also less and it is not so easy to work and clean. On the other hand, thanks to an ingenious device, it can be fastened to tables projecting but little over their frames. Considering the very slight difference in price, machine No. 1 is decidedly preferred.

No. 3. *Bone and Universal Mill "Heureka" (Moh's system), B. 1, worked by hand*: D. R. P. No. 217 638. — It grinds from 4 ½ to 11 lbs. per hour. The price of the mill is 24s 6d. The judges' opinion was the following: Machine No. 3 gives, especially with household bones, good meal. It is easy and safe to work, and relatively cheap.

No. 4. *Bone and Universal Mill "Heureka" (Moh's system), E. 1, with fly wheel, worked by hand*: D. R. P. No. 217 638. — Its output is stated to be 8.8 to 26.2 lbs. per hour. Power required: one horse. Price £4 3s 3d. The judges' opinion was the following: The mill turns out, especially with household bones in a short time a good quantity of excellent meal, but when working to its full capacity it is too slow for a man of normal strength. It is besides too dear.

B. POWER DRIVEN MACHINES.

No. 5. *Bone and Universal Mill "Heureka," Z. Model*: D. R. P. No. 217 638. — The output is said to be 66 to 77 lbs. of coarse meal per hour. The power required to drive it is indicated at 1 H. P. Its price is £14 14s. In the opinion of the judges the machine as it is present is not to be recommended owing to the danger attending

(1) Deutsches Reichs Patent.

nd to the splintery nature of the meal produced from house-
s and ribs.

i. *Bone Mill No. 8.* — The machine is stated to grind 110 lbs.
per hour. The power required is indicated to be 2 H. P.,
price £12 5s. The judges consider it to answer all just de-
mon it. The mill produces per hour a good quantity of excellent
all kinds of bones, and it if were somewhat cheaper it could
more highly recommended.

tracts of recently published Patent Specifications. (England).

3. *Swede and Turnip Harvesting Machine.* (September 29, 1911).
invention relates to a machine for harvesting swedes, turnips,
muzzels, beetroots, etc. It comprises a floating cutting device,
the tops, arranged at the front of the machine and adapted
oved up and down to suit the height of the root tops, a tailing
nsisting of a transversing horizontal blade which passes under
and severs the tail, leaving the same in the ground, an elevator
he tailer, and a cleaner into which the roots are delivered by
tor.

8. *Grain or Seed Drilling Machine.* (May 21, 1912).
invention relates to improvements in a grain or seed-drilling
and consists in providing it with two sets of sowing funnels
sets of coulters so connected that, according to the direction
ment of the machine, one or other of these sets can be brought
tion for service. The drill may be worked either by animal or
wer. In the former case if it be desired to reverse the motion
achine the animal must be harnessed at the other end of the
but in the latter case to obtain the change in direction
it is only necessary to reverse the motor or to reverse a gear
mounted in a suitable place on the carriage frame.

29. *Machine for Sowing Mangold, Turnip, and other Seeds.* (De-
8, 1911).

object of this invention is to provide an improved machine for
turnips, mangold and other seeds, which will reduce waste by
the seed in bunches at equal spaces apart in the drills.

. *Motor Plough.* (January 3, 1912).

invention relates to motor ploughs, and its chief object is to
breakage of the implement or of any of its parts if any of the
ould be arrested by a large stone, the root of a tree, or the
referably, the arrangement is such that the shares are connected
arrier or frame through the intermediary of a spring or springs
a manner that the said spring or springs is or are extended or
sed when any of the shares are moved relatively to the frame,
movement being transmitted to the disconnecting device so as
te the same for disconnecting the motor. The invention further
s improvements in the traction wheels of the plough, in order

to prevent slipping of the wheels, without any earth sticking to the s

425. Motor Plough. (January 5, 1912).

This invention has reference to motor ploughs of that kind wh the plough breasts can be raised or lowered and regulated as to working depth. One feature of the invention is the means employed adjusting the forward ends of the plough beams relatively to the bar. In order to raise the breasts by hand, a spool is mounted a power shaft, which spool can be rotated by a manual lever to raise breasts with which it is in operative connection. When elevating breasts by power, a device actuated automatically by the movement the plough beams is employed for stopping the movement of the b after being raised a given height. A further feature of the inven consists in the provision of improved mechanism for limiting the low of the beasts beyond certain limits. The downward movement of breasts is controlled by a brake shoe acting on a brake drum, the shoe being actuated by a lever which in its initial movement rel ratchet and pawl mechanism holding the plough breasts in their vated position, and in its continued movement operates the brake to control the breasts. The breasts are held in operative position means of resilient supports, the tension of which can be individually collectively regulated.

28797. Manure Distributor. (December 21, 1911).

This invention has for its object to provide an improved ma distributor so constructed as to ensure a positive and efficient fe the manure and a good distribution on the ground; to prevent u working of the manure in the hopper; and to facilitate the cleani the distributing mechanism.

29358. Motor Driven Cultivator. (December 30, 1911).

The purpose of the cultivator described in this specification is particularly to pulverise and bank soil on both sides of a row of pl

11949. Power Driven Plough. (May 20, 1912).

The invention relates to power-driven ploughs of the type comp a tractor and a plough coupled therewith, and has for its object o improvements in this class of apparatus, relating more particularly t method of coupling the tractor's plough frame, and to the assoc appliances for manipulating the plough shares from the tractor.

4910. Clutch Gear for Agricultural Machines. (February 27, 191

According to this invention, improved transmission gear is mad of which connects the seat or the pedal to the clutch spring, and prises a sliding member round which the connection passes, the member being made to slide at will by means of a system of aux gear which the driver can operate when he is seated for causin action of the geared working parts to cease at will.

7814. Rotary Harrow. (April 1, 1912).

This specification describes improvements in the driving and c tion of rotary harrows of the type in which the harrow is drive directly from the main driving wheels through countershafts. Ac

this invention the counter-shafts are carried by a framework to drive the main shafts of the wheels and are driven from these latter shafts, the final drive from the counter-shafts to the harrow roller being by chains.

57. *Grain Harvester*. (Feb. 19, 1912).

The object of this invention is to provide a new grain harvester, adapted to cut the grain and bind it while in an upright position.

New Patents (German Empire).

Patent No. 9225/45-a. (6. I. '13). — This drum for holding the blades of a reaping plough [Fräser pflug (1)] consists of disks mounted on a central axle and connected with each other by ties. Between the disks are placed, and according to the width of the rings used the distance between the disks may be varied.

Patent No. 20981/45 a (2. I. '13). — In this machine for tilling the soil means of several implements mounted on a revolving shaft, and in order to free them from weeds and the like can be set to work successively, the worm wheel of the implement bearing shaft as well as the worm wheel of the crank shaft of the bearing wheels can be driven independently of each other by a common shaft.

Patent No. 10897/45 a. (6. I. '13). — Subsoiler for ploughs. This implement pivots round a pin in the lower end of an adjustable plate, which is fastened to the land-side plate of the plough and is connected to a spring which comes into action only when considerable obstacles are encountered, such as big stones.

Patent No. 65206/54 c. (20. I. '13). — Machine for lifting beets; consists of two arms and of arms connected with the shares by articulated joints. The arms have an up and down motion and are so arranged that they move towards each other.

Patent No. 65740/45 a. (20. I. '13). — Machine plough on the double system. An endless cable is wound round the winding drums and a portion of cable draws an implement forwards and backwards.

Patent No. 255087/45 c. (28. XII. '12). — Automatic tying device for presses. The invention consists especially in the arrangement according to which the hinder shaft itself revolves slowly and couples with the driving shaft, thus starting the knotter, whereas formerly the driving wheel shifted a stop for the coupling pawl.

Observations on Traction Engines. — RINGELMANN, M.: in *Annales de l'Institut National Agronomique*, Series 2, Vol. II, Part. 2, pp. 221-241. Paris, 1912.

The writer shows with the help of diagrams and tables the results obtained in the course of 16 tests carried out with 9 different implements for working the soil. He arrives at the following conclusions: If draught power be taken as 100, the maximum power ranges

from 110.55 to 154.70 and is required for a distance ranging from 27 per cent. of the whole distance. The great differences observed in the various machines are solely due to the nature of the soil.

The writer therefore proposes to adopt 100 for the average haul power and 175 for the maximum. He represents the former by i ; the latter by T and establishes the following equations

$$\begin{aligned} T &= 1.75 \ i \\ i &= 0.57 \ T \end{aligned}$$

It is therefore recommended to base the calculations for a traction engine, both as regards its performance and the resistance due to friction upon $1 \frac{3}{4}$ the average haulage power.

565 - "Case" Steam Traction Engine. — DE CONDÉ, M. F.: in *Bulletin de la Société d'Encouragement pour l'Industrie Nationale*, Year III, Second Half-year, No. Vol. 118, pp. 547-551. Paris, December 1912.

The writer, after giving an accurate description with figures of the principal dimensions of this repeatedly and successfully tested machine, gives an account of the results obtained at the trials made at Châteauneuf and at Bourges respectively, with a 45 H. P. and a 60 H. P. machine of this type.

Hitherto they have been built of 30, 36, 45, 60 and 80 effective H. P. The builder states that a 60 H. P. traction engine can draw a load of 20 tons on the level and from 12 to 15 tons on gradients of up to 10 per cent.

566 - Report on Clearing Land from Tree Stumps by Means of Steam Ploughing Engines. — RINGELMANN, M.: in *Bulletin de la Société d'Encouragement pour l'Industrie Nationale*, Year III, Second Half-year, No. 4, Vol. 118, pp. 546-547. Paris, December 1912.

Communications on clearing land from tree stumps in the Belgian Congo, according to a report by E. Leplace published in the *Bulletin Agricole du Congo Belge*, Vol. III, No. 1.

567 - Certani's Subsoil Plough. — GAMPERT, E.: in *Journal d'Agriculture Pratique*, Year 77, Vol. I, No. 10, pp. 302-303. Paris, March 6, 1913.

The writer describes the subsoil plough built by M. Certani, an Italian engineer, which is now used with great success in the provinces of Ferrara and of Ferrara (Italy). The problem that the inventor set himself was namely to apply to the side of the plough coulter an instrument intended to break up the bottom of the preceding furrow, has been advantageously solved. The object of this lateral application is to prevent the ploughed soil from being trampled by the draught animals. With a team of six or ten oxen a depth of 20 to 22 inches by a breadth of 16 to 18 inches can easily be attained.

Tilling the Soil at One Operation. — RUBARTH: in *Deutsche Landwirtschaftliche Presse*, Year 40, No. 19, p. 231. Berlin, March 5, 1913.

The writer reports on some forms of his patented blade shares; treating of the importance of this kind of implement, he gives examples showing how the new system can be adopted in the simplest manner in various kinds of farms.

A New Machine for Extracting Sisal Hemp Fibre. — *Der Tropenpflanzer*, Year 17, No. 3, pp. 152-154. Berlin, March 1913.

The firm F. Haake, of Berlin, exhibited before a number of managers of plantations belonging to companies interested in Sisal hemp first "Roland" machine destined for German East Africa. For this purpose fresh Sisal agave leaves from Africa had been provided.

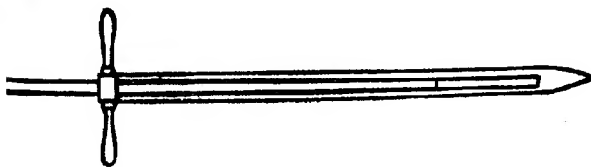
The general opinion of the experts after the trial of the machine is to the effect that it was distinguished by great simplicity and the extraction of fibre was excellent.

The "Roland" machine is built of heavy U iron, and the intermediate gearing is mounted on the machine itself, which is besides provided with ball-bearings of a special type, which allow it to run with extraordinary smoothness.

About 25 H. P. are required to drive it when working at its maximum.

New Sampler. — MANDEKIC: in *Wiener Landwirtschaftliche Zeitung*, Year 63, No. 20, p. 241. Vienna, March 8, 1913.

This sampler (see figure) is about 3 ft. 3 in. long and 1.4 inch in diameter and consists of a hollow cylinder provided with a longitudinal reaching almost to the tip, and a plunger. It is very useful for taking samples from a sack full of seeds, such as clover, cereals, grass and like. The sampler with the plunger in it is thrust down to the bottom



the sack containing the seed to be sampled. Then the plunger is slowly pushed out and the seeds fall through the slit into the hollow of the sampler. When this is full it is drawn out and its contents emptied through its top opening.

This sampler is especially adapted for the examination of clover, about a pound and a half of seeds can be taken out at one operation, saving much time. Another advantage consists in the plunger re-

maintaining movable notwithstanding the entrance of the seed so the choking up of the slit is to be feared.

The sampler is to be had at the Royal Seed Control Station Krizevci (Croatia).

571 - **The "May" Milking Machine.** — *Wiener Landwirtschaftliche Zeitung*, No. 16, p. 187. Vienna, February 22, 1913.

This patent milking machine is remarkable for the great simplicity of its construction. One person, using two of these machines, can milk 24 to 34 cows in an hour. The sole agents for this machine, in Austria and Germany, are Messrs. P. Lübke of Breslau.

572 - **The "Unfehlbar" Automatic Milk Measurer.** — *Oesterreichische Zeitung*, Year XV, No. 5, pp. 69-71. Vienna, March 1, 1913.

This article contains an illustration and a description of the mentioned apparatus, which was patented in Germany as No. 222,471.

573 - **A New Rapid Milk Boiler with Cooling Apparatus for Continuous Work.** AUERBACH, N. in *Zeitschrift für Fleisch- und Milchhygiene*, Year XXIII, 1, pp. 270-273. Berlin, March 15, 1913.

From the researches of hygienists on raw and boiled milk the superiority of the latter appears to be proved. The writer describes the construction and working of a milk heater, which is provided with a device automatically shutting off the supply of milk when the temperature falls below a certain point. A heater capable of heating 53 gallons of milk per hour costs £34 6s. The heating can be done by gas, steam or electricity.

574 - **A Handy Sheep Dip.** — *The Pastoralist's Review*, Vol. XXIII, No. 2, Melbourne, February 15, 1913.

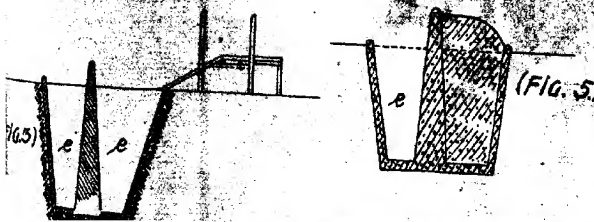
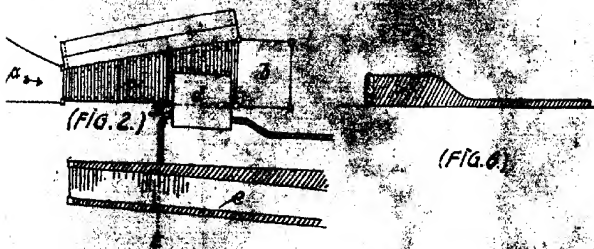
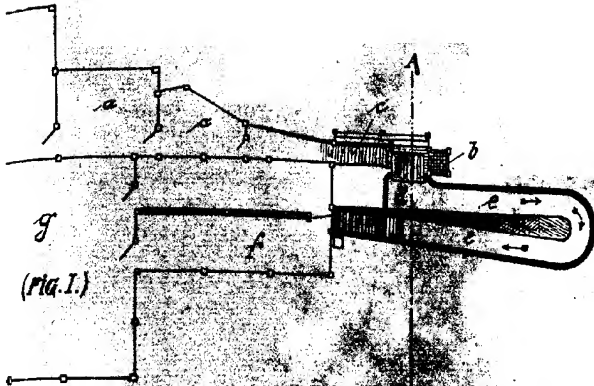
The sheep dip represented in the diagram has all the advantages of a long swim bath at a very reduced cost. The sheep swim back and forth under the control of the man who is penning up before dipping them. When the draining pens are full, he has only to come through the fence and open the gates (Fig. 1).

In Fig. 2, half a dozen sheep are placed in the decoy pen (b) first; the others then are forced up the inclined race (c); on reaching the slide (d) they lose their footing, and glide into the bath. Between the bath and the slide, on either side of the slide, there is a square curtain of raw ox-hide in which the sheep hide the fall and catch the splash.

The slide is made of smooth, well-oiled, well-planed boards, so as to avoid the slightest foothold for the slipping animal. On leaving the bath (e), the sheep first reach the draining pens (f), and finally the drying yard (g).

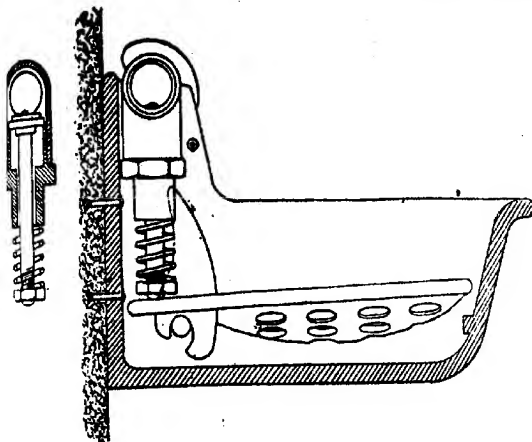
575 - **Automatic Drinking Troughs.** — GODDILL, P. *Installation hygiène de l'étable.* — *L'Hygiène de la Viande et du Lait*, Year 7, No. 2, pp. 62-7. February 10, 1913.

After describing some systems of watering live stock, which are subject to their defects, have not been largely adopted in practice, the writer



as the Manfroid-Bauduin system, which is widely spread in the North France, in Paris and in Belgium, and which from both the hygienic and economic point of view, has given the best results.

As the annexed figure shows, this trough, which is fed directly from



water pipes or from a cistern, consists essentially of the drinking basin, in which a movable plate is so placed as to work a valve. The animal presses the plate with its muzzle and drinks at the same time. When pressure on the plate ceases the valve closes by itself by the pressure of the water by the action of a spring.

Basket-Work Ventilators. — *Wiener Landwirtschaftliche Zeitung*, Year 63, No. 21, 255. Vienna, March 12, 1913.

Farmers are often obliged by bad weather to store hay, straw, cereals or produce before it is dry enough. Spreading in thin layers, making use of the upper and best ventilated storerooms of the farm, and similar measures may to a certain extent save the produce for a short time from rot, but the limited amount of space is inadequate to cope with large quantities of produce. Matters however are very different and the available space can be utilized to a much greater extent when ventilators offering an easy passage to air are used, such as those that H. Schmalzer has placed on the market. They are made of a durable permeable basket-work and when placed at distances of two or three feet from each other in heaps of cereals or of other similar produce they ensure a steady circulation of air, which considerably diminishes the danger of heating and rotting. These ventilators are laid cross-wise in stacks. They are 3 ft. 8 in. long; those made for stacks are 6 1/2 inches in diameter and for cereals 10 inches. They cost 17s 6d to 18s. 6d. per dozen.

RURAL ECONOMICS.

577. **Types of Farming in relation to Distance from Market.** — Printed in *Fühlings Landwirtschaftliche Zeitung*, Year 62, Part 6, pp. 185-213. Stuttgart, March 15, 1913.

The very varied systems of farming depend upon the action of opposite groups of forces: on the one hand those which lead to specialisation of production, and which render a particular locality able for certain products and another locality for other products (differentiation forces), and on the other hand those which tend to unite several branches of production into a whole (integrating forces). The latter tendency is due chiefly to the three following causes: the first of which is the regular distribution of work throughout the year by the economy of human labour, of other power and of capital. This tendency leads to the distribution of the acreage of the farm among a greater and smaller number of different cultures for which the operations of sowing, interculture and harvest fall in different times.

Similar to the well known law of diminishing returns, the increasing expenses may be mentioned as coming into play with the extension given, beyond a certain limit, to any one crop, because in the case of the union of several crops, the utilization of the soil tends to be a one-sided specialization. On the other hand the more appropriate choice of the group of crops to be grown, in respect to the method of production employed, the lower will be the expenses per unit of soil and of production. In this connection the reciprocal complementarity of spring wheat and winter wheat are to each other is specially important. The same connection exists between hoed crops and forage plants, between cereals and oil seeds. The regular distribution of work throughout the year rises in importance with the intensity of farming, with the compactness of the soil and with the relatively unfavourable position of the farm respecting the market.

The second cause which leads to adopting a combination of several crops as against specializing, is the need of utilizing in the best possible manner the conditions of fertility of the soil. The various crops which enter into the rotation must complement each other in their need for growth, as well as in the influence they exert on the fertility of the soil so as to have as far as possible a natural reciprocal reintegration of the fertility of the soil.

It follows thus that in the choice of the crops to be grown together as well as in determining the area and place to be given to each crop in the rotation, the farmer must seek to combine the advantages which result from one grouping of crops rather than another in its bearing upon the conservation of the fertility of the soil, together with those connected with the best utilization of the means of production employed. The most favourable natural and economic conditions of a farm are, therefore, those in which the important for the combination of several crops does the principle

tion become in comparison to the principle of the distribution of work throughout the year.

The economy of manures in the farm is an important factor for the preservation of the fertility of the soil in respect to a given combination of crops, because upon this, in its turn, depend the rational production and utilization of the manure produced in the farm itself. In the first place the production and conservation of nitrogen and of the organic matter in the soil must be considered, and this leads to alternation of crops, cereals and other crops that consume greater quantities of nitrogen with those that accumulate this element, either forage plants which are to be used as green manure.

The third cause, lastly, is the necessity of providing for the upkeep of the means of working the farm, especially of the productive stock, which in most farms is indispensable for the production of manure and for the utilization of certain products of the soil. Most frequently, however, for physiological and dietetical reasons, it is not possible to have rational feeding without adopting mixed food rations, the needs of which must be considered in the choice of the group of crops to be grown; and as such crops must be provided throughout the year, such crops must be grown which completely meet requirements during the whole time. Thus, partly for physiological reasons connected with feeding requirements and partly for agricultural and technical reasons, no individual crop can be considered independently of the bond which unites it to the other crops in respect of its utilization. Only pasture can in exceptional cases maintain independence; all other crops cereals, meadows, clover, hoed forage crops, etc., must be considered as dependent upon complementary crops in the interest of the best utilization of their products.

The disturbance of the equilibrium of these three factors of a given system of farming by extending the relative area given to one crop at the expense of the others injures in three ways the economy of the whole system: 1. The cost of production per unit of area and per unit of product increases in consequence of the increase, for one of the elements of the combination, of the cost of labour. 2. The returns diminish in consequence of the incomplete utilization of the fertility of the soil. 3. The real money value of the product diminishes on account of the difficulties encountered in the suitable working up and marketing of the same.

In opposition to the forces and factors which lead to the combination of crops and to the system of agricultural economy connected with it, other factors are at work in the direction of specializing crops and production, which point out in their turn the localities most suitable to a given crop. In the competition which takes place for the choice of such a locality, a given branch of farming may all the more easily be limited and oppressed, the smaller the advantages of its introduction into the combination of crops in respect of the utilization of the means of production, of the equilibrium of the fertility of the soil, and of the best

realization of its value; or it may all the more easily be extended less it is connected with the other branches of the system of farm

Among the factors which concur in determining a given combination of crops in a given locality (in contradistinction to those which only a temporary variation in the combination), the conditions of sale and sale are of the most vital importance because the place of production is attracted towards the markets by the possibility of saving the cost of carriage and of marketing (concentric belts of Thünen). In respect, hitherto only the ratio between the cost of carriage and market prices of farm produce were taken into consideration; and a conclusion had been drawn that in a good position respecting the market it is the low priced products which cannot stand high transport expenses that prevail, while in unfavourable conditions the prevalence of high priced wares. But in this manner the causes of the differences in the cost of transport are not explained, but simply accepted as a given fact.

In order to understand the influence which sale conditions exert on the locality of production, account must be taken of the variable which exists among the different factors of the cost of production between them and the costs of carriage and of sale on the market of a given unit of saleable products; and secondly of the variable area necessary for their production.

Among the factors determining the choice of the locality of production, the first place is occupied by the elements of cost which are connected with the favourable position as regards the market and with the nature of the products. Among these the costs of carriage and sale act centrifugally and partly centrifugally: that is to say the elements of cost which are due to labour and to the agricultural part of the working capital act centrifugally, while the expenses of purchase deriving from the commercial part of the working capital act centripetally (1) because the former diminishes and the latter increases in price according as the relative position of the farm is less favourable. In proportion as the relative position of a given production improves respecting the market, the saving in the cost of carriage, of sale on the market and of the commercial part of the working capital is partly absorbed by the higher cost of labour and of the agricultural part of the working capital, and this all the more when the latter factors play a greater part in the total production, both absolutely and relatively.

The final influence which the market exerts on the place of production of the various products may be translated into figures by showing the differences of the total costs of production which would be of the same order per unit of product for sale by diminishing the distance between the

(1) The agricultural part of the working capital is that which may be produced on the farm itself (forage, litter, stable manure); the commercial part must be bought (cakes, chemical manures).

the market by a given distance. The items of saving would represent the positive element, the increase of expenses the negative element. The net of this sum depends upon the ratio of these items to each other. It represents the effective saving obtained after deducting from the gross saving the increase of outlay, and may be considered as the index of saving per unit of saleable produce. It may then be said that, other conditions being equal, the product which has the maximum savings occupies in respect to the market the most favourable locality of production.

Thünen, who has made some comparisons of the kind, has arrived at the following general law: With equal production per unit of area, the product which requires the greatest expenses must be located at the greatest distance from the town. Nevertheless, for the above mentioned reasons, this law is not always absolutely true.

The farmer endeavours to secure the maximum profit, not only per unit of product taken to market, but especially per unit of cultivated area; in other words the maximum profit on the land; this is determined not only by the gain per unit of produce taken to market, but by the number of these units which may be obtained from a given area. Thus the adoption of the systems of agricultural economy from the point of view of the sale conditions of the products, of the cost of production and sale on the market, is after all determined not by the saving in expenses per unit of product but by the gain per unit of area. This may be called the index of the profit on the land; it is obtained by multiplying the profit index per unit of saleable product by the number of units furnished by one unit of cultivated area.

This is only for those products which have the same requirements as regards the extent of area necessary to produce the same unit, that the index of profit on cost of carriage and sale prevails practically over the index of profit on the land, especially when the first index is influenced by transport rates.

The writer then shows, by means of an example with figures, that the series of products arranged according to the decreasing order of their value coincides with the series obtained by arranging them according to the increasing profit on the land. This confirms the justness of the general law according to which, with equal cost of carriage and of production, the least valuable products are raised in the neighbourhood of the markets, and vice versa, with the only difference that until now the positions of cause and effect had been inverted in the explanation of the causes which determine the locality of production: the difference in value was considered as the cause of the fact and consequently of the system of farming, whilst in reality the causes lie deeper. The difference in value must be partly considered as an effect of the situation of the place of production.

In studying the facts of the adaptation of the combination of crops to the conditions of sale, from the point of view of the least cost of

delivering the products on the market, one comes to the same conclusion that the index of the profit on the land is decisive, because a product must compete with the others for the best locality of production; the profit on the land deriving from these products forms part of the total cost of production of the product in question and weighs more or less heavily upon it.

Considering the fact from a purely theoretical standpoint, a product which has a negative index of savings, even without being transported, with the profit on the land, may be delivered cheaper from a locality further from the markets than from those situated nearer.

The writer does not believe, however, that this is the case in every instance quoted by Thünen, namely of butter making; but he thinks that it may happen for other products, certainly for cotton and perhaps for flax.

As for the problem of the adaptation of the combination of crops to the conditions of sale, from the point of view of quantity, then the choice of a combination of crops prevents the formation of belts in the sense of a real specialisation or distribution of production; it does not, however, exclude the quantitative variation of the branches of production under the influence of the local conditions of sale. The more favourable these conditions are, through the relative position of the farm to the markets, the greater is the number of saleable products which form part of the combination of crops in order to suit the requirements of the multiplicity of production.

Considering then the ratio existing between products rendered marketable by means of the various agricultural industries and the products not rendered marketable in this way, from the point of view of their relative position to the markets, it is clearly seen that the more favourable this position is, the greater the need for the farm to render its products marketable by means of industrial processes so as to diminish in general the weight of the products to be carried to the markets and amounts from the economical point of view to a diminution of the profit on the land. Besides, the products not rendered marketable by means of agricultural industries generally show a higher expense for manures; they therefore tend to localize in the neighbourhood of the markets, that is to say where the fertilizing materials taken from the soil can be returned to it more cheaply.

578 - *The Sizes of Agricultural Holdings in England and Wales and 1912.* — *Board of Agriculture and Fisheries, Agricultural Statistics, 1912, Vol. XLVII, Part I, pp. 6-8. London, 1913.*

The number of agricultural holdings — *i. e.* of separate occupancies of agricultural land exceeding one acre in extent — in 1913 in England 374 809 and in Wales 61 077, together 435 886, being an increase of 576 over 1911. The increase was due to holdings of from 300 acres, which increased by 1301, while small holdings

acres and large occupations of over 300 acres decreased in by 550 and 175 respectively.

In 1905, 628 of the larger farms (of over 300 acres) have disappeared, being for the most part subdivided into smaller holdings. In the same period, holdings of 50 to 300 acres have increased by 2 229 and those of 1 to 5 acres by 2 229.

The number of persons occupying land in England and Wales has increased in the course of seven years by 3 313. It is to be noted that during that period, the farmed area has diminished by 1 000 acres, involving of necessity the extinction of a large number of holdings. A net increase of the number of holdings into the dwindling agricultural land is divided is consequently the significant.

Large farms, nevertheless, still occupy a very considerable portion of the country. About 25 per cent. of the total farmed area is made up of farms exceeding 300 acres, while nearly 60 per cent. is made up by medium farms of 50 to 300 acres. Small holdings of 50 acres or less, though forming about two-thirds of the total number of the holdings, account for little more than 15 per cent. of the agricultural land of the country.

The difference between England and Wales as regards the size of farms is considerable. In Wiltshire 55 per cent., in Northumberland 47 per cent., and in Berkshire, Cambridge, Dorset and Hampshire 47 per cent. of the agricultural land is farmed in holdings of over 300 acres. On the other hand, in the whole of Wales (with the exception of Radnor), in Cheshire, Cornwall, Derbyshire, Lancashire and Monmouth, not more than 10 per cent., and in Lancashire and half the other counties less than 5 per cent. of the land is taken up by large farms.

In the 374 809 holdings in England in 1912, there were 81 884 of from 1 to 5 acres, 168 038 (44.83 %) of from 5 to 50 acres, 139 522 (37.24 %) of from 50 to 300 acres and 14 230 (3.8 %) of over 300 acres; while in Wales, the numbers were respectively: 10 314 (16.89 %), 63 182 (63.18 %), 17 937 (29.37 %) and 342 (0.56 %).

Examining the Price of Sugar Beets in France. - FLUGRET, E.: in *La Vie rurale*, Year 2, No. 16, pp. 437-439. Paris, March 22, 1913.

The sugar manufacturer wishes to ensure a sufficient supply of material for the autumn, he is obliged to purchase the sugar beets early or March, i.e. two months before the crop is sown. The price he obtains depends upon the yield per surface unit of the land. Several metric tons are required annually to supply the sugar-factory, and he tries to purchase the crop of 1000 hectares which are estimated to be producing an average of 12 English tons per acre. This is very advantageous to the farmer, who thereby ensures a market for his crop in a good or a bad year. On the other hand, the sugar-

manufacturer has no guarantee as to the amount of the consignment for the yield may be 25 per cent. above or below the average, so instead of 30 000 tons he may get only 22 500 or as much as 37 500. In the first case, the manufacturing cost per ton of sugar beets will be much higher; in the second, the unusual prolongation of the winter season necessitates unusually long storage of the beets, with a consequent loss of sugar.

In order to reduce this risk to a minimum, the writer suggests the following principal method of purchasing the raw material should be adopted: The farmer shall undertake, either to deliver a certain fraction of the average estimated crop of the area under beets (e.g. $\frac{5}{16}$ of the yield of 10 hectares at 30 tons per hectare, i.e. 250 tons), with the reservation that he shall have the right of the disposal of any surplus or to supply the whole estimated amount (300 tons) plus or minus 10 or 15 per cent.

The price of sugar beets depends upon their quality and upon the price of sugar quoted on the Paris Bourse at the time of purchase.

The quality is estimated by the density of the juice, which is ascertained when the consignment is made. The price of sugar beets paid is fixed for roots of 1.070 density, or as it is usually termed, 70° density. For every tenth of a degree above or below 70°, the price rises or falls by a sum varying from 30 to 50 centimes according to arrangement. In the writer's opinion, it would be far juster to estimate the price of the beets from the actual sugar content, rather than from the density of the juice.

The second factor which determines the price is the difference between the price per quintal quoted for sugar No. 3 (white sugar) by the Paris Bourse for the time of extraction, at the date when the manufacturer makes his contract with the grower, and that of a ton of sugar beet of 70° density delivered at the factory. This difference represents the margin for manufacturing costs and profit, and cannot be less than 6 fr. after subtracting carriage and brokerage).

The sugar manufacturer endeavours to insure himself against loss by taking contracts for sugar based upon the contract he has already made for the purchase of beets; but owing to the present method of buying beets, which depends upon the yield of the surface unit, he may be exposed heavily, as the crop is subject to great variations. Thus in the bad year of 1911, many sugar-manufacturers, in order to fulfil their contracts, were obliged to purchase larger or smaller quantities of sugar at considerably higher prices, although they had prudently only engaged themselves to deliver from 80 to 90 per cent. of the amount of sugar which they expected to obtain from their contracts for the purchase of beets.

The writer recommends the adoption of the following method of fixing the price of sugar beets: The buyer and seller shall fix a difference between the price of beets and that of sugar, which will leave a definite margin of profit to the manufacturer. The seller shall have the right to determine the date at which the price of the beets shall

this depending upon the prices of sugar quoted on the Bourse. the price of sugar quoted by the Paris Bourse in February and the date of the sale-contract) not seem sufficiently high to the he shall have the right, until September 30, to take the prices for sugar by the Paris Bourse at any date he likes as the basis to determine the price of beets for the working season of the factories (October, November, December). If he prefers to fix the beets according to the sugar market at periods other than the manufacturing (4-month periods beginning January, March), he has only to inform the buyer by letter, and the price will be by the quotation for sugar on the Paris Bourse the day following which his letter is received at the factory. Should this period by the seller be the period of manufacture, the price of one ton of 7° density is that of one quintal of sugar over the three-period beginning October, less the difference agreed upon; but the grower have chosen a later period, the amount to be sub- is increased by 25 centimes for every month, in order to com- the manufacturer for the increased expense of storing, insur- etc.

ample: X, a grower, sells in March to Y, a manufacturer, 400 sugar beets on the basis of 7° density and that the fixed sum subtracted from the sugar price is 6 fr. The Bourse quotes No. 3 at this date as 29 fr. per quintal for the quarter beginning October; would give 23 fr. per ton of beets, which X considers too low. At a date between March and September 30, the price for the quarter beginning October is 31 fr.; X informs Y by letter that he wishes to settle the price, which is effected by adopting the price quoted by the Bourse after the receipt of the letter, for the quarter beginning October. If the price of sugar does not rise by September 30, X waits still longer, but after a certain time, the price of sugar for the 4-months beginning October is quoted at 34 fr. X informs the manufacturer, and the price of beets is settled at $34 - (6 + 8 \times 0.25 \text{ fr.}) = 26 \text{ fr.}$ It would be reasonable to arrange that if the price of sugar should rise above a certain fixed limit, e.g. 35 fr., the surplus should be divided between the grower and the manufacturer. The writer is of opinion that the adoption of this method would be to the advantage of both grower and manufacturer.

1 Years' Returns of a Cherry Orchard in Holland (1). — *Rechtvaardigheidsproef van kersboomgaard*. — *Departement van Landbouw, Nijverheid en Handel, Verslagen en Mededeelingen van de Directie van den Landbouw*, No. 1, pp. 57-59. The Hague, 1913. In 1900, a cherry orchard of $\frac{1}{2}$ hectare (about $1\frac{1}{4}$ acre) was laid out in Holland; standard trees of two varieties (Black and Spanish) planted 26 ft. apart. The cost of making the orchard was £28 18s 6d

and the value of the land was £ 14 17s 6d, so that the whole cost expended amounted to £ 43 16s. Potatoes and kohl-rabi were grown every year as intercalary crops; the net profit of these was about 11. The receipts and expenditure for the year 1900 were as follows:

<i>Expenditure</i>	<i>£ s d</i>	<i>Receipts.</i>	<i>£</i>
Interest on capital laid out, at 4%	1 15 0	Net profit of potatoes and turnips.	
Amortisation of outlay, at 2%	11 6		
Cost of manuring	4 2 9		
Wages of labourers	1 13 8		
	<u>£ 8 2 6</u>		

There was thus a loss of £ 7 6s, or £ 5 18s 3d per acre. In 1901 this loss was increased by 6 per cent. (8s 9d) by the sums paid for interest and depreciation; in 1902 by the extra expenditure of 11s and 1901, so that it amounted to 8s 9d + 9s 3d = 18s; in 1903 18s + 9s 9d = 27s 9d; in 1904 to 27s 9d + 10s 6d = £ 1 18s 3d; in 1905 to £ 1 18s 3d + 11s = £ 2 9s 3d.

The cherry trees bore for the first time in 1906; from that year until 1911 the balance was as follows:

1906.

<i>Expenditure.</i>	<i>£ s d</i>	<i>Receipts.</i>	<i>£</i>
Expense as in 1900	8 2 6	Potatoes and kohl-rabi	5
Interest on loss in 1905	2 9 3	Cherries	3
Total	10 11 9	Total	4
Subtract	4 2 6		
Loss	<u>6 9 3</u>		
Loss per acre £ 5 4s 8d.			

1907.

<i>Expenditure.</i>	<i>£ s d</i>	<i>Receipts.</i>	<i>£</i>
Expense as in 1906	10 11 9	Potatoes and kohl-rabi	5
Interest on loss in 1906	7 9	Cherries	7
Total	10 19 6	Total	8
Subtract	8 5 3		
Loss	<u>2 14 3</u>		
Or per acre £ 2 4s.			

1908.

<i>Expenditure.</i>			<i>Receipts.</i>		
	£	s d		£	s d
as in 1907	10	19 6	Potatoes and kohl-rabi		16 6
on loss in 1907		3 3	Cherries	10	15 0
Total	11	2 9	Total	11	11 6
			Subtract	11	2 9
			Net profit	0	8 9
			Or 7s 1d per acre.		

1909.

<i>Expenditure.</i>			<i>Receipts.</i>		
	£	s d		£	s d
as in 1909	11	2 9	Potatoes and kohl-rabi		16 6
			Cherries	11	11 6
			Total	12	8 0
			Subtract	11	2 9
			Net profit	1	5 3
			Or 20s 6d per acre.		

1910.

<i>Expenditure.</i>			<i>Receipts.</i>		
	£	s d		£	s d
as in 1910	11	2 9	Potatoes and kohl-rabi		16 6
			Cherries	16	10 9
			Total	17	7 3
			Subtract	11	2 9
			Net profit	6	4 6
			Or £ 5 os 10d per acre.		

1911.

<i>Expenditure.</i>			<i>Receipts.</i>		
	£	s d		£	s d
as in 1911	11	2 9	Potatoes and kohl-rabi		16 6
			Cherries	20	13 3
			Total	21	9 9
			Subtract	11	2 9
			Net profit	10	7 0
			Or £ 8 7s 6d per acre.		

581 - **Scheme of Prizes for Best Managed Small Holdings. Suggestions to petitors.** — *Board of Agriculture for Scotland, Leaflet No. 6, 4 pp.* Edin February 1913.

The Board of Agriculture for Scotland started in 1912 a Scheme of prizes for small Landholders, whose holdings were best kept and managed. These small landholders include all occupiers of holdings rented at not more than £50, or rented at more than £50, but not exceeding 50 acres in extent exclusive of common grazings.

The following points will receive the attention of the judges:

- 1) The conditions of the house and premises, including, stables, and poultry houses.
- 2) The number and quality of the stock; the croft should be sufficiently stocked and attention paid to pig-rearing.
- 3) Cropping and cultivation; the extent of the waste land, the condition of the crops, rotation, drainage, the increased size and improvement of the fields, and the hedges and shelter-belts planted.

582 - **Dairying versus Fattening.** — BONDY, AUGUST: in *Wiener landwirtschaftliche Zeitung*, Year 63, No. 19, pp. 231-232. Vienna, March 5, 1913.

The writer speaks of the reasons governing the choice of either of these industries and then gives diagrams and tables showing the results of the years (1902-1912) obtained in the farm under his direction, where both cows and cattle for fattening were kept. According to these data, the former branch of the industry had been remunerative during the ten years question, while the latter had been a loss.

583 - **Rotations in the Middle West of the United States.** — SNYDER, A. J. How and Why of Crop Rotation. — *Successful Farming*, Vol. XII, No. 2, pp. Des Moines, Iowa, February 1913.

After setting forth the chief rules to be observed in selecting a rotation the writer gives some rotations suitable for the farms of the Middle States and describes, by means of diagrams, the necessary division of fields according to whether the farmer is chiefly interested in raising crops, or in cattle-breeding.

AGRICULTURAL INDUSTRIES

584 - **The Effect of Freezing upon the Composition of Milk.** — MAI, C. in *wirtschaftliches Zentralblatt*, Year 42, Part 5, pp. 129-131. Hannover, March 1913.

In order to ascertain the effect of frost upon milk, the writer conducted five experiments. The milk was, in every case, placed in closed cans and put in the open to freeze.

I. — Ten litres of milk were exposed for 15 hours to a temperature of -3°C. (26.6°F.). When the vessel was opened, the milk appeared to have undergone no alteration; a thick layer of cream had risen and the milk was liquid. Only when it was poured through a sieve, could it be set

ystals up to 3 inches in length were floating in the milk. The total of these crystals was 50 gr.; the fat content was 2.1 per cent, and the index 26.8 according to the scale of the Zeiss dipping refractometer. The composition of the original milk was : specific gravity 1.0324, index 39, fat 3.4 per cent., solids not fat 5.05 per cent.

— A can containing 20 litres was filled with milk of the following composition : specific gravity 1.0315, refractive index 39.2, fat 3.5 per cent., solids not fat 8.84 per cent. After the can had remained for a day and two in a temperature of -10°C . (14°F .) the appearance of the contents was as follows : above lay a mass of somewhat loose, frothy, flaky ice weighing in the middle were 3 or 4 litres of liquid milk, while the bottom and the sides of the vessel were covered with a thick coating of solid ice. The following figures were obtained :

	Specific weight	Refractive index	Fat per cent.	Solids not fat per cent.
Upper loose ice. . .	1.0175	34	7.7	6.3
Liquid portion . . .	1.0450	50	2.5	11.87

The whole contents were again replaced in the receptacle, which was put up in a room at $+18^{\circ}\text{C}$. (64.4°F .) until the milk again became entirely liquid ; this took two days and a night, while the water in another can, which had been frozen solid, thawed completely in scarcely half the time. The thawed milk had the following composition : specific gravity 1.0317, refractive index 39.9, fat 3.5 per cent, solids not fat 8.85 per cent. II. — Ten litres of fresh milk were exposed to a temperature of -21.2°F . After 14 hours, the writer observed that a crust of ice as thick as a finger had formed on the sides of the vessel; the can was closed and left for another 24 hours to the same temperature. The results were : the upper portion was frozen into frothy flaky ice with a weight of about 1 lb.; the portion which had remained liquid, about 4 litres, was passed through a sieve, and the ice crust which was adhering to the walls was broken up and added to the rest of the milk. The following figures were obtained :

	Specific gravity	Refractive index	Fat per cent.	Solids per cent.	Degree of acidity
Original milk	1.0317	38.5	3.4	8.87	6.5
Upper loose ice	1.0233	37.5	11.1	8.57	—
Ice adhering to sides	1.0165	28.0	3.2	4.92	—
Portion which had remained liquid	1.0534	52.2	2.0	13.85	—
Combined	1.0321	38.5	3.3	8.95	7.3

IV. — Ten litres of milk were exposed for 16 hours to a temperature of -8°C . (17.6°F .); the contents of the vessel had a similar appearance that in experiment III; the liquid portion, which was passed through sieve, contained translucent crystals. After the component parts had analysed they were again combined. The results are given in the following table :

	Specific gravity	Refractive index	Fat per cent.	Solids per cent.	D of α
Original milk	1.0312	38.7	3.6	8.78	
Crystals	—	35.3	3.0	—	
Portion which had remained liquid	1.0352	41.3	2.9	9.65	
Ice adhering to sides	1.0172	30.4	5.8	5.75	
Recombined	1.0320	38.7	3.5	8.96	

V. — In order to observe the results in the case of milk which had quickly cooled to a low temperature, the writer cooled 10 litres to 0°C .; shook it thoroughly and then left it for 30 hours in a temperature of -15° to -18°C . (5° to -0.4°F .). A small portion of the milk was taken the purpose of observing it when turning sour; this was kept in a chamber, but unfrozen. The contents of the vessel presented the same appearance: after separation of the parts, the whole was left standing for days at a temperature of from $+3$ to 4°C . (36.4° to 39.2°F .), and again examined. The following table gives the results of this experiment.

	Specific gravity	Refractive index	Fat per cent.	Solids per cent.	D of α
Original milk	1.0318	38.6	3.7	8.94	
Upper loose ice	1.0256	40.2	11.6	9.30	
Portion which remained liquid	1.0534	53.5	3.3	14.17	
Ice adhering to sides	1.0201	30.1	2.9	5.75	
Recombined	1.0320	38.7	3.6	8.97	
Milk in refrigerator	—	38.6	—	—	

The experiments further showed that freezing does not perceptibly alter the smell and taste of milk, but when milk has been frozen, on thawing it turns sour more quickly.

the strength of these experiments, the writer advises caution in samples of milk in winter and says that milk which has been frozen be sold at a low temperature, but not before it has completely

Composition of Ewes' Milk in Hungary: Analytical Results from Municipal Laboratory of Agricultural Chemistry at Kecs-kemét. — BIRÓ, adv: in *Kiskislatógi Közlemények*, Year XVI, No. 1, pp. 89-96. Budapest, January-ary 1913.

milk yield of the ewes belonging to the Racka and Cigája at present reared on the great plain of Hungary being relatively the Royal Hungarian Agricultural School at Kecs-kemét is trying this can be increased by crossing them with the Frisian breed. The following table gives the average of the analyses of the milk of the Racka X Frisian cross, and 25 of the Cigája X Frisian. Milking was done three times a day: morning, noon and

	Specific gravity of the milk	Specific gravity of the serum	Specific gravity of the dry matter	Total solids	Fats	Solids not fat	Ash
				per cent.	per cent.	per cent.	per cent.
.....	1.0370	1.0338	1.2563	17.57	6.34	11.23	0.78
.....	1.0374	1.0335	1.2428	18.40	6.84	11.78	0.80
.....	1.0370	1.0327	1.2349	19.17	7.41	11.75	0.72
.....	1.0372	1.0328	1.2283	19.56	7.63	11.97	0.77
.....	1.0364	1.0330	1.2087	20.63	9.02	11.55	0.82

The Lisbon Milk Supply. — NOGUEIRA, J. V. PAULA.: in *Boletim da Associação Geral da Agricultura Portuguesa*, Second Series, Vol. II, No. 1, pp. 24-30. Lisbon, January 1913.

critical description of the hygienic conditions of the milk trade in Lisbon, followed by the proposal of a municipal control of such trade, adopted by the « Sociedade Portuguesa de Medicina Veterinária ». In the proposal it is urged that the milch cow stables within the city be closed; that the milch animals should not be allowed to be driven in the streets, that the cows whose milk is intended for sale in the city should be submitted to sanitary examination, as well as the milkers and milk salesmen, and that the milk sold in the city be from time to time submitted to chemical and bacteriological examination. The milk shops are to sell only whole milk (with at least 3 per cent of butter fat) or only skimmed milk; and that only three grades

of milk be allowed for sale: certified milk, that is supplied by and that have undergone the tuberculin test and that are properly such milk to be milked and kept with special hygienic precautions common milk; pasteurized milk.

- 587 - **The Estimation of the Efficiency of Commercial Rennet.** — VAN in *Departement van Landbouw, Nijverheid en Handel, Directie van den Land*
Verlagen van Landbouwkundige Onderzoekingen der Rijkslandbouwproefstation,
pp. 5-33. The Hague, 1912.

An account of experiments with Devarda's method for determining the coagulating property of commercial rennet, which the writer found to be unsatisfactory. A new method, devised in the Hoorn laboratory, is subsequently described and recommended.

- 588 - **Study on the Technique of the Manufacture of Parmesan Cheese, Type.** — SAMARANI, CARLO: in *Bollettino del Ministero di Agricoltura, Industria, Commercio, Relazioni e studi scientifici e tecnici*, Year XI, Series C., Part
pp. 39-42. Rome, 1912.

This is a chemical and bacteriological investigation on the various phases of the manufacture of Lodi cheese and a determination of the most favourable temperature conditions and bacterial content in each of them. The work was carried out in the laboratory of bacteriology of the Royal Experiment Station for Cheese-making.

Starting from the results obtained, the writer has devised a method of cheese-making based on the following processes: 1) the milk is cooled, and flows into the boiler with the same degree of acidity that it has when freshly milked (about 4° of acidity Soxhlet); 2) introduction into the milk of a culture of lactic bacilli of the greatest fermentative energy in the proportion of 4 ½ cubic centimetres per gallon; 3) keeping the cheeses for 12 to 24 hours at a temperature of 37 to 40° C.

- 589 - **A Thread-Forming Lactic Acid Bacillus (*Bacillus casei* filiformis).** — GORINI: in *Zentralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten*,
Vol. 37, No. 1-3, pp. 1-3. Jena, March 8, 1913.

The description of a new thread-forming lactic acid bacterium, which was isolated 10 years ago by the writer from Grana cheese, and which preserved its thread-forming property.

- 590 - **Reactions for Distinguishing Fresh Milk from Botted Milk.** — BERNHARDT: in *Molkerei-Zeitung*, Year 23, No. 9, pp. 98-101. Berlin, March 1, 1913.

The writer tested the reactive properties of several guaiacum tinctures and guaiacum-guaiacol tinctures, and examined the effect of the addition of hydrogen peroxide, used as a preservative, upon the guaiacum reaction.

The experiments, which turned out in favour of the guaiacum-guaiacol tinctures, showed that the addition of a small amount of hydrogen peroxide slightly increases the reaction.

Determination of the Fat Content of Cream by Dr. Köhler according to the Hoffmeister Rinsing Method. — HOFFMEISTER: in *Oesterreichische Milch-Zeitung*, Year 20, No. 6, pp. 83-85. Vienna, March 15, 1913.

The writer draws attention to the defects of Gerber's dilution method for determining the fat content in cream, and then describes a modified method adopted by Dr. Köhler (of Prenzlau), which differs from the former in that the pipette in which the cream is measured, is rinsed with milk as above. The writer considers this simpler and more exact than the most suitable for introduction into general practical use. The manner in which it is carried out is explained by means of diagrams.

Money Value of Skimmed Milk. — KIRCHNER: in *Molkerei-Zeitung*, Year 31, No. 7, pp. 73-75; No. 8, pp. 87-88. Berlin, February 1913. The writer estimates the feeding value of skimmed milk according to usual methods, and comes to the conclusion that, in estimating the value of whole milk in Germany, at least 1 1/2d per gall. must be set off for the value of the skimmed milk.

Milk Dairies at Riga. — FISCHER, ALB. Ein vorbildlicher stadtmilch-Industrie. — *Molkerei-Zeitung*, Year 27, No. 15, pp. 271-273. Hildesheim, February 21, 1913.

The writer mentions in a few words the newly-established Central Milk Dairies of the city of Riga, which has been equipped according to the newest methods of hygiene and dairy technique. It need only be added that the dairies have been made for supplying cream cheese, as well as yogurt, homogenized milk, and nursery milk; a special cowshed has been built for the latter purpose.

Nursery Milk Establishment of the Town of Stendal, Germany. — FISCHER, ALB. — *die Schlacht- und Viehhof-Zeitung*, Year 13, No. 9, pp. 129-130. Berlin, March 2, 1913. Infant mortality has considerably decreased in Stendal since the establishment of the Nursery Milk Establishment, which was founded some years ago. In 1911, 15.4 per cent. of the infants given the nursery milk died before completing their first year, while the mortality amongst children on other milk amounted to 30.5 per cent. In order to decrease the mortality still further, it was decided to pasteurize the milk in future and to admit such cows to the shed of the nursery milk establishment as passed a searching veterinary examination, instead of relying, as heretofore, upon the results of the tuberculin test.

The Supplying of the French Meat Market. — HITIER: in *Bulletin de la Société de l'Encouragement pour l'Industrie Nationale*, Year 112, No. 2, pp. 336-345. Paris, February 1913.

Hitier first compares the stock census of 1910 with that of 1911 and shows that the number of stock in France, with the exception of horses and pigs, is increasing. The number of horses rose from 3 197 7300

in 1910 to 3 236 110 in 1911. In 1911 the mules had increased by head over 1910, though the number of donkeys had somewhat diminished. In 1911, over 60 000 horses were slaughtered for meat in Paris.

The total number of cattle in 1911 was 14 552 430, as against 14 531 in 1910. The cows increased by 10 400 head and the bulls (1) by 121 but there was a decrease in young cattle and steers; this is attributed to writer to increased export and to earlier maturity.

The 1911 census showed a further decrease in the number of which was 694 370 less than in the previous year. The decrease occurred in all classes, but was especially noticeable in the case of ewes. 1 000 000 sheep are annually imported into France.

The number of pigs, which was 6 900 250 in 1910, had fallen in 1912 over 400 000. The writer attributes this continual decrease to a deficiency of suitable food (potatoes).

If the results of the census are compared with the increase in production, it is clear that in spite of the increasing number of cattle exported, France can produce much more meat than is required for her own consumption.

M. Hitier also considers the question as to how far Madagascar and West Africa could supply France with meat. According to Prof. M. who has studied live stock in these districts, cattle-breeding is one of the chief sources of revenue of the Madagascar farmer. The cattle (excl. zebu) produce meat of good flavour, but the animals are not scientifically treated and mature late. Official statistics, in which the wild breeds of the island do not appear, give the number of zebus as 1 4 500 000, of which about half are females. Each year some 500 000 are slaughtered. As from 250 000 to 300 000 head amply supply the needs of the island, Madagascar could send every year at least 100 000 to France if the trade were properly organized (2).

The official statistics of French West Africa give the number of as 5 000 000. These belong partly to the zebu and partly to the N. breed. Though the latter are useless for export on account of their small size, yet when crossed with zebus they give very satisfactory results. Zebus of the French Congo fatten easily; their average weight is 1 100 lbs. and they kill 50 to 55 per cent. In the Sudan, the price of zebu is from 35 to 50 shillings, but it is twice as much in Dakar.

M. Hitier also deals with the best method of transporting the meat to Europe and recommends the creation of Cold Storage Depots and the refrigeration of the meat.

In the last two chapters, the questions are discussed of the arrangement of the existing slaughter-houses and the inspection of consignments of frozen meat from America and Australia. The writer lays stress upon

(1) In this category are placed bull-calves to be kept for breeding (taureaux) and those that will be castrated (bouvillons). The writer considers this division ill-arranged.

(2) See No. 30, B. Jan. 1913.

arrangement of the slaughter-houses (especially their equipment with storage chambers), the necessity for slaughter-houses in cattle-rearing areas, and for forbidding the export of animals taken to the municipal slaughter-houses. It is also very desirable that the declaration of frozen carcasses be obligatory, as since January 6, 1912, portions of carcasses, as well as whole carcasses, may be imported.

Pregnant Animals slaughtered in Germany in 1913. — ZIEB: in *Deutsche Jagd- und Viehhof-Zeitung*, Year 13, No. 9, p. 128. Berlin, March 2, 1913. The writer gives a summary of the number of cows, ewes and sows, during the second half of the past year were found to be pregnant and slaughtered at the large slaughter-houses in Germany. He also gives details of the foeti.

Studies of Wines. — PARIS, G.: in *Bollettino del Ministero di Agricoltura, Industria e Commercio*, Year XI, Series C, Parts 11 and 12, pp. 1-29. Rome, November 4 December 1912.

In this report, which is supplemented by many tables, the writer (Director of the Laboratory of Agricultural Chemistry at the Royal School of Agriculture at Avellino) deals with a certain number of questions in 9 chapters bearing the following titles: The nitrogen content of natural wines. — Researches and studies concerning the presence of citric acid in wines. — The presence of nitrates in wines. — The determination of free lactic acid in wines. — The estimation of volatile acidity in wines. — The estimation of sulphur dioxide in wine-making. — The tests proposed by the Society of Swiss Chemists for testing wines. — The composition of the musts of natural wines of the Provinces of Avellino and Benevento. — The Service for the application of the law of July 11, 1904 (No. 338), which aims at preventing fraud in the manufacture and sale of wines.

The Effects of Transport upon Wines. — MATHIEU, L. Vins et voyages. *Journal d'Agriculture pratique*, Year 77 (1913), Vol. I, No. 10, pp. 305-307. Paris, March 15, 1913.

Wines which have travelled far often become turbid and lose some of their bouquet and occasionally acquire a distinctly bitter taste. These alterations are caused by excessive susceptibility to oxidation on the part of the wine, due partly to the presence of easily oxidisable substances, and partly to its very high oxydase content. The latter is especially a consequence of bacterial fermentations, which take place in these wines after bottling. Fortunately, the experience of nearly half a century has proved that bottled wines, if pasteurized, can be kept in high temperatures and transported under any conditions, without their susceptibility to oxidation giving rise to any permanent depreciation even in the case of long journeys, when the bottles are partially empty. For this reason, the writer constantly recommends pasteurizing bottled wines.

599 - **Crystalline Deposits in Wines.** - MATHIEU, L.: in *Journal d'Agriculture, Year 77* (1913), Vol. I, No. 8, pp. 240-241. Paris, February 20, 1913.

Small deposits of very different appearance, but formed of the substances (potassium bitartrate and a little neutral calcium tartrate) often found in wines. The formation of these deposits, which is largely due to the wine has been exposed to a low temperature and possesses a high tartaric content, can be taken as a sign that the wine has not been watered. Winemakers should take into account the fact that the amount of tartar precipitated represents so much decrease in the dry extract of the wine.

600 - **The Removal of Acidity from Musts and Wines.** MATHIEU, L.: in *Viticulture*, Year 20, Vol. XXXIX, No. 1005, pp. 393-398. Paris, March 20, 1913.

After giving a short historical review of the subject, the writer discusses the action of cold and of various saturants in freeing musts and wines from acids, and concludes that the best results are obtained by the use of neutral potassium tartrate. The article also refers to the legal side of the question.

601 - **Abnormal Musts and their Treatment.** - ASTRUC, H. in *Revue de Viticulture*, Year 20, Vol. XXXIX, No. 1001, pp. 254-265. Paris, February 20, 1913.

The composition of a grape-must may vary considerably according to the effect of the weather and the parasitic attacks which the vine has undergone during the year. The anomalies affect primarily the chemical composition of the must, this being noticeably altered; secondly they influence the natural microbic content. The writer fully studies both these points and mentions the precautions necessary in making wine from abnormal musts.

602 - **On the Composition of the Maconnais-Beaujolais Wines from the 1912 Vintage.** - FATUREL, G.: in *Le Progrès Agricole et Viticole*, Year 39, No. 343-348. Montpellier, March 16, 1913.

The writer analysed 43 samples of red wines and 13 of white wines. The results given in the 4 tables make it possible to estimate the composition of the whole vintage, which was that of an average year.

The alcoholic strength varies, in the case of the red wines, from 12°, and in that of white, from 9 to 12°.

603. - **The Application of Artificial Cold to Food Products (Early Vegetables, Meat, Fish, Musts and Wine) in North Africa.** - LECQ, H.: in *Revue Agricole et Viticole de l'Afrique du Nord*, Nos. 47 and 48, pp. 102-108 and 131-134. Algiers, February 1 and 8, 1913.

In this communication, which was made to the Second International Cold Storage Congress (Toulouse 1912), the writer deals with the possible application of artificial refrigeration to agricultural products in North Africa and treats of it especially from two points of view: 1) Exportation of perishable articles of food: vegetables, meat, fish

ture of wine, particularly as regards the fermentation of musts
 their transport in a natural condition.
 the second part of his paper, which is the more developed and
 as very interesting details respecting wine-making in hot climates,
 later enumerates the many advantages which can be obtained from
 use of artificial cold.

The Manufacture of Nipa Alcohol in the Philippines (1). - CAVEL, I., in *Revue Gé-
 nérale de Chimie pure et appliquée*, Year 15, Vol. XVI, No. 2, pp. 17-20. February 2, 1913.
 The leaves of the palm *Nipa fruticans* rise from the stem a little
 above the soil, thus giving it the appearance of a large ornamental
 plant with a height of 8 to 10 ft. The plantations are situated near the
 coast and form actual forests crossed by innumerable streams. There
 they grow abundantly on land alternately submerged and left dry by
 the tide. The fruit is formed of drupes, which on reaching maturity
 fall to the ground and are carried away by the tide to places
 where the soil has become muddy and where they eventually germi-
 nate. According to Enrique Zobel and Conrado, the plant is mature at
 the age of 4 years; and from 1000 to 1200 occupy an acre.

The saccharose content of the sap (called « tuba ») is sometimes
 10 per cent., i. e. nearly as high as that of the juice of the sugar beet.
 Zobel has observed that the sap of the trees growing near the sea
 is richest in sugar. The « tuba » is obtained towards the end of
 January, or beginning of March, after the ripe fruits are gathered. A
 blade is attached to the incised stem, which catches the sugary
 drop by drop. It is necessary to keep on cutting the stem so that
 the « tuba » may not obstruct the pores. The average yield per tree
 is $\frac{1}{2}$ to 9 gallons; the amount increases during the first 50 or 60 days
 of tapping, and decreases in the subsequent 30 days. If the tree
 is not tapped, it dies.

The must ferments of its own accord in 24 to 30 hours; it is then distilled
 and alcohol of 94 to 96° is obtained. The primitive methods employed in
 fermentation and distillation result in a yield of from 3.8 to 4 per cent.
 of alcohol. In case of sap with an average sugar content of 14 per cent. It
 is therefore by advantageous to try and improve this production,
 if there are really 1000 trees per acre, each furnishing 9 gallons of
 10 per cent. sap, a yield of 12500 lbs. of sugar ought to be obtained per
 acre. This remarkable product would be of much value to all countries
 with a hot damp climate, like that of the Philippines.

The Content of Soluble Nitrogenous Substances, as a Criterion of Flour. -
 ROUSSEAU, Eug. and SIMON, MAURICE: in *Annales des Falsifications*, Year VI,
 3, 52, pp. 78-84. Paris, February 1913.

In the estimation of flour, analytic results, as a rule, merely con-
 firm the judgment passed upon its quality by the miller or the baker.

(1) See No. 2384, B. Aug.-Sept.-Oct. 1911.

as a result of a trial of its bread-making qualities, or even of a examination. Sometimes, however, chemical analysis reveals no characteristics in flours which are perceived by the baker to be. The writers have studied such cases, and have ascertained some of great practical importance. The estimation of soluble nitrogen, total nitrogen, of gluten and of acidity in twenty kinds of flour of quality has shown that the proportion of soluble nitrogen to total nitrogen varies within very narrow limits, and that, in good flours always about 1 to 5.72. This proportion sinks rapidly if the flour is kept under bad conditions and may become very low (1.15) in bad flours.

A whole series of experiments made by the writers on flours of different origin and in which they established the proportion $\frac{\text{total nitrogen}}{\text{soluble nitrogen}}$, has proved that this must be about 5.72 for the flour to be good for bread-making.

Suspicious flours which had shown on analysis too much acidity but were considered good by the baker, have proved to vary very much as regards the normal proportion of $\frac{\text{total nitrogen}}{\text{soluble nitrogen}}$. This instance shows why the bakers prefer making bread from rather old flour with perceptible acidity, as this does not affect the bread-making as much as has been supposed.

Flours of normal composition, but with the proportion $\frac{\text{total nitrogen}}{\text{soluble nitrogen}}$ considerably below the normal were, on the other hand, unsuitable for bread-making.

The writers record the same decrease in flours which "relâcher" as well as a progressive diminution in flours which have been under bad conditions of preservation.

The writers conclude that:

1. In good flours the proportion of total nitrogen to soluble nitrogen is about 5.72 to 1.
2. As soon as this proportion falls below 5.2, the flour is of inferior quality and is in some way unsuited for being made into bread.
3. It seems to be a corollary that for flour to be good for bread-making it is necessary that the amount of soluble nitrogen present must be above-mentioned proportion to the total nitrogen content, and independently of the acidity, which is sometimes not high in bad flours.
4. The estimation of the proportion of total nitrogen to soluble nitrogen is the best method for enabling chemists to pronounce some certainty upon the bread-making quality of the flour submitted to them for examination.

(1) This term is applied to flour, usually made from badly harvested grain, which after kneading, and when left for a time before placing it in baskets, gives a product which rises to the surface. The baker is obliged to add more flour and re-work it, thus obtaining less bread and a product of inferior quality.

The Chemical Composition of Sharps and Bran. — TANGI, F. and WEISER, S. — *der kgl. ungar. thierphys. Versuchsstation in Budapest.* — *Die Landwirtschaftlichen Versuchs-Stationen*, Vols. LXXIX and LXXX, pp. 323-328. Berlin, 1913.
analysis of Hungarian bran and sharps.

Average chemical percentage composition.

	Water	Ash	Crude protein	Fat	Crude fibre	Nitro- gen-free extract
Sharps (15 samples).	13.00	5.98	15.30	4.50	9.45	51.77
Bran (25 samples) .	13.00	6.78	15.50	3.60	8.91	52.21

The higher fat content of sharps is characteristic and due to the presence of portions of the embryo. The pure protein and starch contents discussed.

Researches on the Digestibility of Bread. — NEUMANN, M. P. Mitteilung aus der Versuchsanstalt für Getreideverarbeitung, Berlin: in *Die Landwirtschaftliche Versuchs-Stationen*, Vols. LXXIX and LXXX, pp. 449-463. Berlin, 1913.

As the organoleptic properties of the Prussian soldiers' black bread (kommissbrot) entirely compensate for its slightly inferior digestibility, continued making of this bread is considered justifiable.

Experiments with a bread and beer diet are discussed, as also the method of determining the fatty matter in bread; for this purpose Bisk's method is recommended; or that by the writer and Kahring.

PLANT DISEASES

GENERAL INFORMATION.

608 — **The Establishment of a Danish Phytopathological Station for the Inspection of Plants Destined for Export to the United States.** — *Communiqué of the Danish Office of Correspondence with the International Institute of Agriculture.*

In accordance with a suggestion advanced by the Society of Danish Nurserymen, the Ministry of Agriculture of Denmark has approved the establishment of an official Inspection Station for living plants, in order to comply with the regulations of the "Plant Quarantine Act of August 1912", which was passed by the United States for the purpose of the importation of living plants to that country (1).

The following are the regulations for this Inspection Station:

§ 1. — The Control Station is entitled: "The Station of the Ministry of Agriculture for the Inspection of Nursery Gardens and Non-Fruit Garden Produce."

§ 2. — The inspection Station is under the direction of the Ministerial Adviser in Agricultural and Forest Zoology (at present Prof. Boas, Ph. D.), and the Ministerial Adviser in Plant Pathology (at present Kölpin Ravn, Ph. D.); the latter acts as Manager of the inspection Station. No special remuneration is received by the Adviser for the discharge of these duties.

§ 3. For the performance of the actual control work, the Directors of the Inspection Station appoint one or more Assistants, experts in plant pathology, whose appointment must, however, be sanctioned by the Ministry of Agriculture. The Assistants are required to keep a register of all the work done at the Inspection Station, and to submit the same to the Director, at the close of each financial year, with a report of the inspections made in the course of the year.

The Assistants receive 20 kronen (22s 6d) in payment of their services, which sum according to § 7, is paid by the requirer of the certificate. In addition, they receive 10 kronen a day for their expenses during official journeys, their travelling expenses also being according to § 7.

(1) See No. 182, B. Feb. 1913.

§ 4. — Nursery gardeners who desire the inspection of their produce, address to the Manager of the Inspection Station at least a fortnight before the time of the required inspection, stating when and where the latter is to take place, and the number of plants to be inspected.

§ 5. — Only plants raised in Danish nurseries are inspected. The inspection takes place immediately before the packing of the consignments in question.

After August 1, 1913, only such consignments of plants can be accepted as come from nurseries which have been under supervision since the development of the plants and have been found free from injurious insects and such plant diseases as may be regarded as communicable.

Requests for inspection must be made every year to the Director of the Inspection Station, by July 1 at latest.

§ 6. — If the consignment is found to be free from injurious insects and plant diseases, a certificate to this effect is given. The certificate is signed by the Assistant who has made the examination and is attested by the Director of the Inspection Station. Two copies are made, one of which is given to the applicant, while the other is kept in the archives of the Inspection Station. The certificate is written in a prescribed form, the text being in both Danish and English. The form is sent free of expense by the Manager of the Inspection Station.

§ 7. — The drawing up of the above-mentioned certificate costs the recipient 20 kronen. He has, in addition, to defray the expenses of his journeys undertaken by the Directors or Assistants, for the purpose of the inspection, i. e. 10 kronen per day for their expenses for the second class railway fare, or first class steamer fare; he is also obliged to convey the officials to and from the nearest railway station or steamer landing-place.

§ 8. — The payments mentioned in § 7, are to be made to the Manager of the Inspection Station on his presenting the account. All correspondence regarding this, or other matters regarding the Inspection Station, should be directed to the Manager of the same.

§ 9. — The cost of printing the forms mentioned in § 6 is defrayed by the Association of Danish Nurserymen, which is regarded as representative of the nursery gardens in the matter of the inspection at the Station.

§ 10. — An account of the receipts and expenditure of the Inspection Station for every financial year, as well as a report of the work during the same period, is sent by the Manager to the Ministry of Agriculture. The cost of keeping the register mentioned in § 3, as well as the postal expenses of the Manager and his assistants, are paid by the State and included in the statement of accounts furnished by the Manager.

BACTERIAL AND FUNGOID DISEASES.

609 — **Plant Diseases in Grenada 1911-1912.**— AUCHINCLOSS, GILBERT: in *Report of the Department of Agriculture for the West Indies, General Administration, Report of the Agricultural Department, Grenada 1911-1912*, pp. 6-7. Barbados, 1913.

Scale Insects and Black Blight. — Scale insect attacks have not been of serious commercial importance in Grenada, as cacao, almost the sole crop of the island, is practically free from the insects; but to the accompanying black blight, and in view of the likelihood of the future development of citrus cultivation, their control is of a most considerable importance.

The controls known in Grenada at present are: shield scale (*Cephalosporium Lecanisi*), red-headed fungus (*Sphaeroscleria cacao*), black fungus (*Myriangium Duriaei*), scarlet ladybird (*Cycloneda sanguinea*), small black ladybird (probably *Scymnus* sp.), spotted ladybird (*Maculata*), and a hymenopterous parasite (*Coccophagus*). Of these the first named is at present of great importance and the red-headed fungus is likely to be of much use.

Bud rot of Coco-nuts. — This has been noted on the west coast in districts of the northern and southern parishes; the spread of the disease has been very slow and, so far, the felling and burning of the trees has been found the safest means of control. At present, importation of coco-nuts from countries known to be infected is prohibited by law.

Root Disease. — This is due to a fungus (*Rosellinia* sp.), which attacks cacao, nutmegs, castilloa, avocados, immortels (*Erythrina*) and camphor, and possibly bananas, in Grenada. Of these, cacao and nutmegs appear the most seriously attacked. Cacao suffers in very damp localities. The fungus has been found in every district of the island, and since castilloa is attacked immediately after planting in the forests, it is probable that the disease is naturalized in Grenada. This point, however, requires further work.

Boll Disease of Cotton. — This is probably of bacterial origin. A continuous record of its ravages has been found from 1903 on. It is at present a serious obstacle to cotton-planting on the heavy soils of Grenada. The bolls are attacked just before opening, with the result that the carpels shrivel and the lint cannot arrive at maturity. Selection of disease-resistant types is probably the most satisfactory line of future work.

Thrips. — These insects (*Physopus rubrocinctus*) commit considerable ravages annually in the dry season, on cacao, causing discoloration of the pods and defoliation of the trees. The continuous defoliation sometimes leads to the death of the latter. This insect is usually associated with defective methods of tillage and draining, but it is probable that its attacks are sometimes intimately connected with dryness and lack of shade.

read blight and horse hair blight are two fungi occurring on nutmegs: the former is not thoroughly known, while *Marasmius equi-* is at present of mere botanical interest in Grenada, having only d two or three trees.

the shield-back bug (Nezara viridula) is a nuisance on pigeon pear, o and cowpeas in the southern drier districts of the island. A hard-back beetle attacked cotton in 1911. The insect appeared e numbers in October and November and fed on the bases of tals and stamens of the flowers.

The Germination of the Winter Spores of *Plasmopora viticola* (1) - var. L. and VIKOR, G.: in *Comptes rendus hebdomadaires des séances de l'Académie des sciences*, 1913, 1st Half-year, Vol. 156, No. 10 (March 10, 1913), pp. 800-802. Paris, 13. - *Le Progrès agricole et viticole*, Year 30, No. 11, pp. 327-331, figs. Montpellier, March 16, 1913.

The writers record having observed, since 1911, in the case of thou- of zoospores, that when these are placed in suitable conditions: isture and temperature, no rigid ramified conidiophore is formed, fine, sinuous, flexible mycelial thread of very variable length, easily makes its way between the cells of the leaves of the host and reaches the exterior, by means of either the stomata or some of the leaf-tissue. The free end of the mycelium at once swells at extremity, giving rise to a single conidium, similar in form to the per conidium, but much larger. As soon as it is mature, the con- idm separates from its stalk like the summer form, the contents up, and an aperture appears at the apex; through this the zoo- escape in one or two batches. The writers have counted up to 40 es per conidium, but consider this is below the actual number. n as the zoospores have escaped from the conidium, they separate im rapidly in the water. These winter forms much resemble the r zoospores in shape and structure, but are often larger and their re occasionally swollen at the tips.

placing the zoospores in a drop of water on the lower surfaces leaves of *Vitis vinifera*, the writers have observed, at the end of ury and the beginning of March, both conidiophores and lesions due fungus.

hey finally describe an easy method of technique to be adopted in ing for germinating zoospores; such a search might furnish useful tions for forecasting the first outbreak of mildew.

***Peronospora Cephalariae* sp. nov.** - VINCENTS, F. Étude d'une espèce nouvelle de *Peronospora*: *Peronospora Cephalariae* nov. sp. - *Bulletin trimestriel de la Société Mycologique de France*, Vol. XXIX, Part 1, pp. 174-180, plate VI. Paris, arch 1, 1913.

A description of the new species of *Peronospora* discovered in 1909 on *Cephalaria leucantha* Schrad., and afterwards observed on

) See also No. 427, B. April 1913.

two other plants of the same genus in the Toulouse Botanical Garden. This fungus is very near *Peronospora Dipsaci* Tul., which occurs on teasel (*Dipsacus fullonum* L.), but is quite distinct from it.

612 - **The Wetting Power of Fungicides** (1). — FONZES-DIACON, H.: in *Progrès et école*, Year 30, No. 11, pp. 331-332. Montpellier, March 16, 1913.

VERMOREL, V. and DANTONY, E. *Ibid.* (Édition de l'Est-Centre), Year 34, No. 12, pp. 36. Montpellier, March 23, 1913.

M. Fonzes-Diacon suggests a simple method by which vine growers may ascertain whether the cupric sprays used for the control of peronospora really possess "wetting power", which, according to M. Ravaz' definition, means that instead of running off the green parts they spread on them thus covering them with an even coating of mixture, and at the same time reaching the interior of the most compact clusters of blossoms; these are hardly touched by ordinary "non-wetting" fungicides. For it is only necessary to prepare the cupric mixture by dissolving the powder to be used in a quart of ordinary water; after stirring it, a vine leaf should be dipped into the mixture. If the latter has the wetting property, the leaf, on withdrawal, is found to be covered with a uniform uniform film, both surfaces being alike wetted, which would not have been the case had the leaf been dipped into water or an ordinary "non-wetting" cupric mixture. Further, when the leaf has become completely dry the air, it will be observed that the mixture has left a continuous coating of copper compounds on all the surfaces with which it has been in contact. Experiments made with bunches of grapes, at any stage of development, should give the same results. When the vine is not a leaf, the "wetting" property of the mixture can be tested on cherry or ivy leaves.

MM. Vermorel and Dantony, on the other hand, contend that the wetting property of the mixture can only be tested by applying it to the vegetative organs for which it is destined, and observing if these are covered with a uniform coating.

To test the "wetting" property of a mixture still better, a little thylene blue may be added; then, if the leaf is immersed and dried, subsequently placed in a letter copying-press, a clear and faithful impression is left of the vine-leaf, showing that the treatment has been wholly successful.

613 - **Rotting of Tomatoes caused by *Phytophthora lycopersicum* sp. nov.** — GROENVEGE, F.: in *Centralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten*, Part 2, Vol. 37, No. 1-3, pp. 16-31, 1 plate. Jena, March 8, 1913.

In the course of the summer of 1911, the Phytopathological Institute of Wageningen (Holland) received several times tomatoes attacked by rot, which showed itself in the form of brown patches, usually corresponding to the point of insertion of the style, but sometimes occurring also on the

(1) See also No. 1236, B. Aug. 1912.

of the fruit. The rot extended all round the portion first attacked so affected the underlying tissues, in which microscopic examination showed the presence of bacteria only.

In the Netherlands, the disease was observed in 1904 for the first time; afterwards recorded in the annual reports of the Wageningen Phyto-logical Station for 1906 and 1910.

At a still earlier date this disease was recorded as occurring in North of France (1895) by Prillieux, who considered it of bacterial origin, in North America (1896) by Earle, and in England and Denmark as a strup.

The writer was able to make practical researches in the West of Holland as to the appearance, development and spread of the disease. Though of a serious nature, it nevertheless was of frequent occurrence in the district.

He considers that there is a connection between the appearance of the disease and the prolonged cultivation of the tomato, which practice gives rise to a partial soil sickness (not to be wholly remedied by the use of manures) and consequently to a decrease in the resistance of the plants to the disease.

In a greenhouse in the neighbourhood of Wageningen, where tomatoes have been grown for a long time, the rot did much injury. On replacing the old soil to a depth of 10 or 12 inches by fresh earth, the tomatoes subsequently grown succeeded well. This shows, according to the writer, that the parasite generally occurs in the soil and that the presence of the tomato plants is favourable to its development. The latter is also assisted by the practice of leaving the diseased fruits on the ground. It is therefore necessary to collect and carefully destroy all tomatoes attacked by the disease and not to use them for manure. If the soil is renewed at entirely short intervals, the percentage of fruit attacked is considerably reduced. When possible, it is well to turn over the soil in such a manner as to substitute a completely fresh layer for the former surface soil. Another factor predisposing the plants to the disease is dampness; greenhouses used for tomato cultivation should therefore be suitably ventilated.

Usually the fruits which are nearest the ground are the first attacked, and the disease is limited to them, which proves, in the writer's opinion, that the infection comes from the soil.

Mr. Groeneweg was able to isolate, from material sent to him from different parts of Holland, a bacterium, which he describes minutely under the name of *Phytobacter lycopersicum* sp. nov.

Infection experiments showed this bacterium to be a wound parasite. Nevertheless, the writer is not in a position to assert whether this micro-organism is the first cause of the disease, or whether, as Earle supposes, it gets way into the fruit through punctures made by small insects. He states that this opinion of Earle's is, at present, a mere hypothesis.

- 614 - A Case of Specialized Parasitism in the *Uredineae*: *Gymnosporangium tremelloides* parasitic on the hybrid *Sorbus confusa* Gmel.
GUINIER, PH.: in *Comptes rendus hebdomadaires des Stances de la Société de B*
Vol. LXXIV (1913), No. 11, pp. 648-649. Paris, March 21, 1913.

In the neighbourhood of Annecy (Haute-Savoie), the following are found growing together in the same coppice: *Juniperus communis*, *Sorbus Aria* Crantz, *S. terminalis* Crantz, as well as a large number of their hybrid *S. confusa* Gmel. In 1911-1912, the writer observed that *S. Aria* was severely attacked by *Gymnosporangium tremelloides* R. & S., *S. terminalis* was completely immune; the hybrid, on the other hand, shared almost equally the immunity of *S. terminalis* and the susceptibility of *S. Aria*, as far as this fungus was concerned. *S. confusa* has sufficient resistance to the parasite to limit its extension and, as a rule, to prevent the normal formation of aecidia, but not enough to arrest its development. Its resistance, however, varies as regards individual fungi, which develop simultaneously on the same leaf. The fact that only some of these produce aecidia seems to point to the existence of races more, or less, capable of overcoming the immunity of *S. confusa*; in the opinion of the writer, we have here the beginnings of a specialised form. M. Guinier intends continuing his observations in this direction.

PARASITIC AND OTHER INJURIOUS FLOWERING PLANTS

- 615 - *Hyoscyamus agrestis* Kit. in Poppy Crops. — MALZEFF, A. J.: in *Zeitschrift der Samenprüfungsanstalt am Kaiserlichen Botanischen Garten zu St. Petersburg*, Vol. I, Part 7, 9 pp. St. Petersburg, 1912.

M. Malzeff has identified seeds of *Hyoscyamus agrestis* Kit. collected in Podolia, Volinia, Kherson, Jekaterinoslav, Kharkov, Voronezh and Kursk. It has been observed, both by himself and others, that *H. agrestis* infests the poppy crops of South and South-West Russia, as well as the fields of millet and flax in the Province of Voronezh.

INSECT PESTS.

- 616 - *Injurious and Beneficial Insects of California*. — ESSIG, H. O.: *The Bulletin of the State Commission of Horticulture*, Vol. II, No. 1-2, pp. XXX + 321 figs. Sacramento, California, January-February 1913.

A concise and practical description, for the use of Inspectors of Fruit Culture and of Horticulture, of the insects and other invertebrates of known economical importance existing in California. The writer

* (1) According to the *Index Kewensis*, *Hyoscyamus agrestis* Kit. is a synonym of *Hyoscyamus niger* L.

count of the general appearance of each species, its life-history, its host plants, and the natural and artificial methods of its control. Hints follow on catching the insects, the use of collections, and the different remedies used. A list is given of the legislative enactments and administrative measures in force in California respecting the parasites of plants.

***Cocobacillus Erausquinii* sp. nov. Parasitic on *Romalea miles* in Argentina.** — COLLEN, HUGO and MAGGIO, CARLOS. Descripción de un nuevo *Cocobacillus* Patógeno para la Langosta. — *Boletín del Ministerio de Agricultura*, Vol. XIV, No. 12, pp. 1368-1373, 3 figs. Buenos Aires, 1912.
A detailed description of *Cocobacillus Erausquinii* sp. nov., isolated by the writer from some diseased specimens of locusts, *Romalea miles* Drury, which they found in January 1912 in the Department of Las Colonias. There are many characters distinguishing the new species from *C. Acridis* d'Herelle.

Parasites of Insects attacking Sugar Cane. — PERKINS, R. C. L.: *Reports of the Work of the Experiment Station of the Hawaiian Sugar Planters' Association, Entomological Series, Bulletin No. 10*, 27 pp. Honolulu, Hawaii, 1912.

This is a systematic description of different Chalcids, which are all reared from the eggs of insects, parasitic on the sugar cane in Hawaii, Africa, Fiji, China and the Malay archipelago. The genera *Neocryptus*, *Jassidophthorus* and *Eomymar* are new to science, as are also 1 species belonging to the genera *Oetetrastichus*, *Closterocerus*, *Podoplatys*, *Pentarthron*, *Gonatocerus* and *Polynema*.

The Caterpillars of *Thaumetopoea (Cnethocampa) herculeana* Injurious to Low-Growing Plants in the Neighbourhood of Tunis. COMTE, A. Les chenilles nuisibles aux plantes basses. — *Revue Agricole et Viticole de l'Afrique du Nord (Tunis-Maroc)*, Vol. II, No. 44, pp. 33-34, 1 fig. Algiers, 1913.

The writer records the presence, in the neighbourhood of Tunis, of a numerous number of the caterpillars of *Thaumetopoea (Cnethocampa) herculeana*. These, before pupating, migrate and devour every kind of low-growing plant, whether wild or cultivated: cereals, lucerne, clovers, thistles, vetches, lettuces, spurge, docks, etc.

The writer recommends for the control of this pest, the burning of the caterpillars as soon as they are discovered, and the destruction, during winter, of weeds growing near crops.

***Phytalus smithi* and other Insects Injurious to Sugar Cane in Mauritius.** — D'ENNEZ DE CHARMOY, D. *Rapport sur Phytalus smithi (Arrow) et sur les Scarabées s'attaquant à la Canne à sucre à l'île Maurice*, 35 pp., 8 plates, 1 fig. Port Louis, 1912.

In the first part of his report, the writer gives a detailed description of the development and habits of *Phytalus smithi* Arrow. This insect.

See No. 750, B, April 1912.

See No. 1587, B Nov. 1912.

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having been energetically controlled in 1911, thanks to the intervention of the Government, did not reappear in Mauritius the next year; theless it is necessary to continue to keep a careful and systematic lookout in the district where it occurred.

Amongst the natural enemies of *Phytalus* are a minute mite (*sus* sp.), and some micro-organisms which have so far not been mined. Further researches are necessary as to their efficiency in control of the pest. Amongst insecticides should be mentioned especially petroleum emulsion with creolin or with carbolic acid.

A list and description follows of the other Scarabeids which *Phytalus*, live at the expense of the sugar-cane roots. These are *retus versutus*, *A. compressus*, *Serica* sp., *Oryctes tarandus*, *O.* in *Oryctes* sp., *Gymnogaster buphihalma*, *Agrypnus fuscipes*, *Eutocius*, *Opatrum crenatum*, *Cratopus punctum*, *Trocharocephalus strangulatus*.

In conclusion, the writer enumerates other insects attacking cane in Mauritius: a) Lepidoptera — *Cyllo leda*, *Leucania unipuncta*, *loreyi*, *Sesamia nonagrioides*, *Spodoptera mauritia*, *Diatraea* s. *Grapholita schistaceana*, *Alucita sacchari*; b) Hemiptera — *Aphis* s. *Tetraneura lucifuga*, *Dactylopius calceolariae*, *Sphaerococcus* s. *Chionaspis tegalensis*.

621 — *Icerya purchasi* damaging Tangerines and Lemons in Sicily. — FANI, PIERRE TEODOSIO: in *Bollettino del Regio Orto botanico e Giardini di Palermo*, Year XI, Part 1-2-3 (Jan.-Sept. 1912), pp. 81-82. Palermo, 1913.

The orange scale, already known from the citrus groves of Messina and Catania, has recently been observed at Bagheria. There, the tangerines are already dead, and a good many young lemons are in the process of dying.

622 — Notes on the Chief Insects affecting Forest Trees in Great Britain. — JEMMETT, C. W. *South-Eastern Agricultural College, Wye (Department of Entomology)*, 44 pp. + figs. Ashford and London.

A description, accompanied by plates, of the chief insect pests of forest trees in Great Britain and of the best methods of their control. In the appendix, the means of preventing the damage done by these insects are briefly described.

623 — Chalcids Injurious to Forest Tree Seeds. — ROHWER, S. A.: in *U. S. Department of Agriculture, Bureau of Entomology, Technical Series*, No. 20, Part VI, p. 1. Washington, 1913.

The Chalcids hitherto known to be injurious to the seeds of forest trees (*Sorbus* spp., *Abies* spp., *Tsuga* spp., *Pseudotsuga* sp.) are: *Syntomaspis druparum*, *Megastinus* sp., *M. brevicaudis*, *bilobius*, *M. pinus*, *M. spermotrophus*. The complete life-cycle of the first-named, which is also destructive to the apples.

